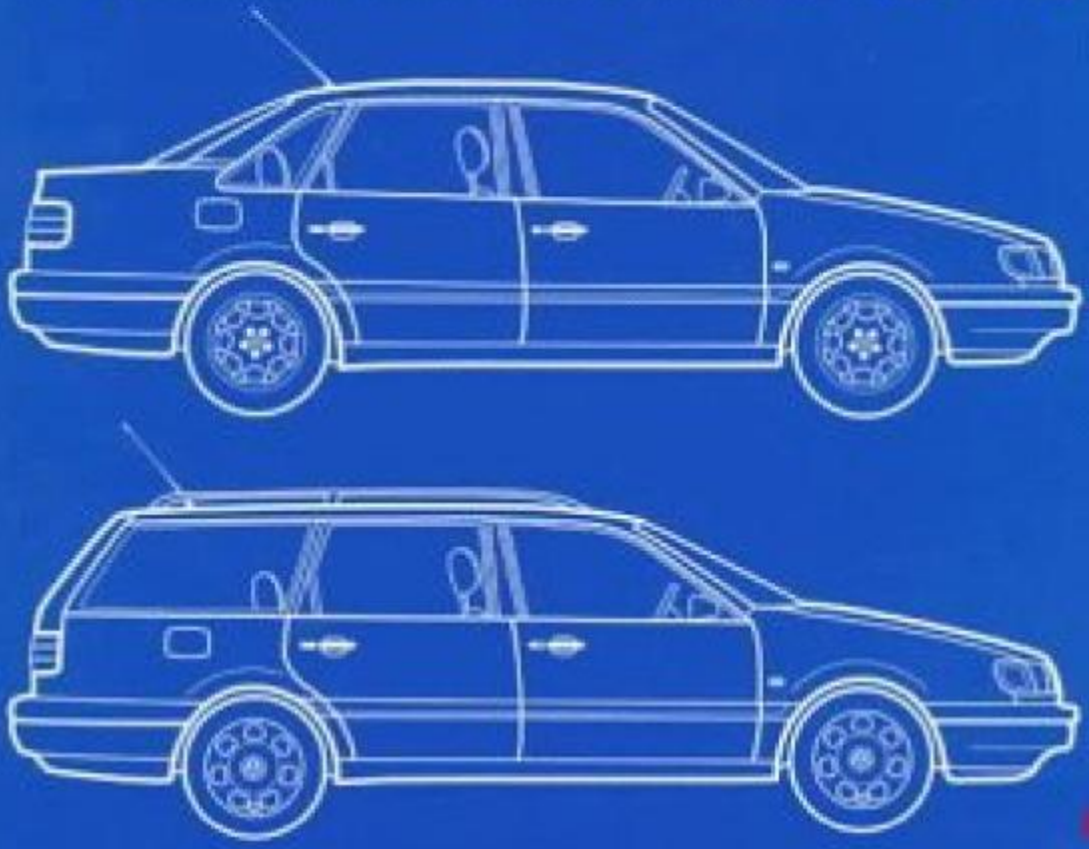
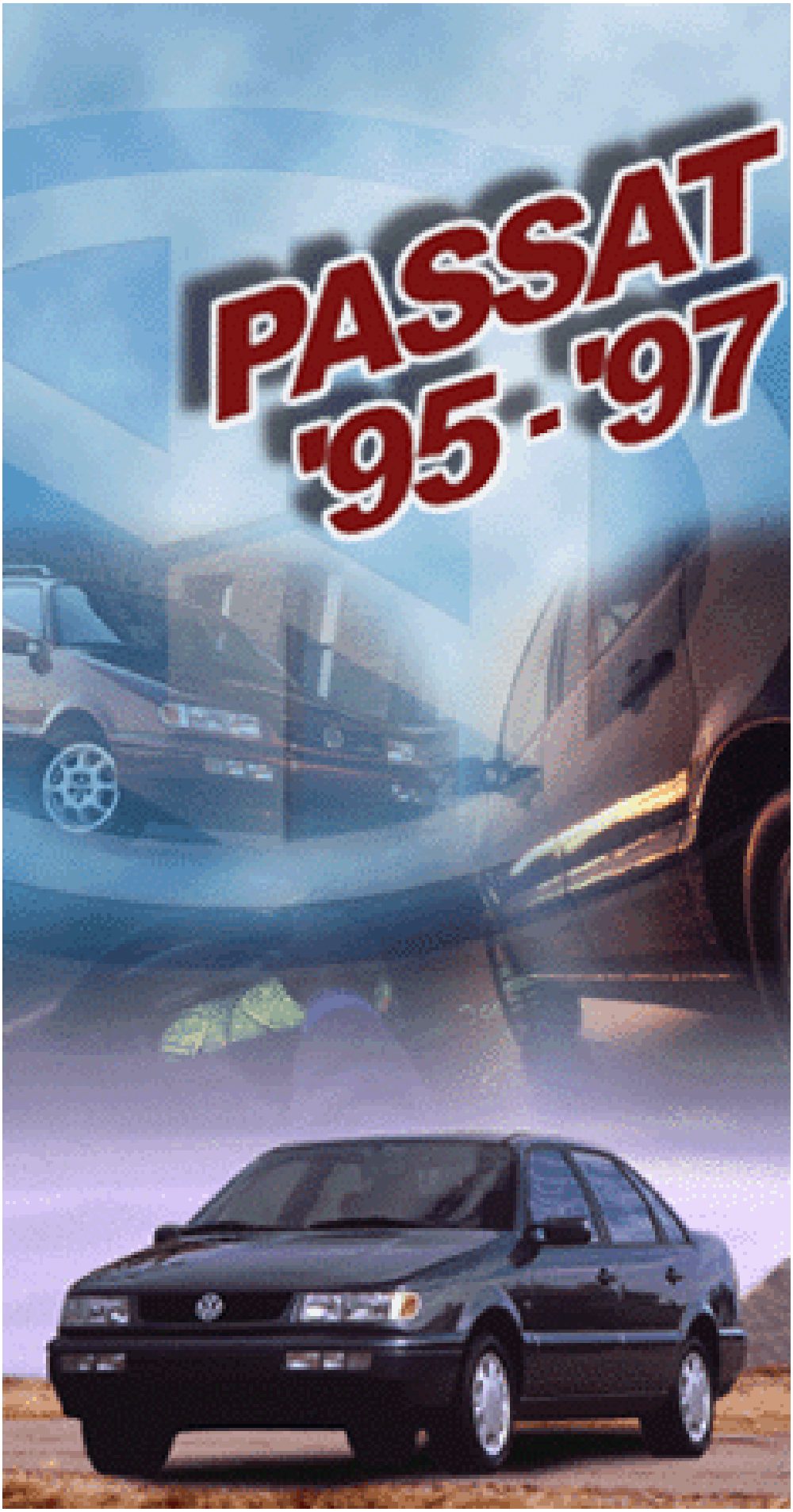
Volkswagen Passat

Official Factory Repair Manual

1995, 1996, 1997
Gasoline, Turbo Diesel, TDI
4-cylinder and VR6, including wagon



Robert Bentley


PASSAT
'95 - '97

Maintenance

Maintenance

Engine overview

Oil change service
Oil change service every 10,000 miles (15,000 Km)

Inspection service
Inspection service every 12 months
Inspection service every 20,000 miles (30,000 km)

General Information
Type plate
Vehicle Identification Number (VIN)
Engine code and engine number
Vehicle, lifting
Tow starting/towing

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Toothed belt for camshaft drive (gasoline engine), check condition and tension
Toothed belt, check wear (TDI engines)
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Fuel filter, draining water (Diesel engine)
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Automatic transmission, changing ATF
Power steering fluid level, checking
Brake fluid, changing
Brake fluid level, checking
Battery, checking
Idle speed (Diesel engine code AAZ): Checking
Headlight setting, checking
Road test, performing

Engine overview

	Engines →	Gas engine
Code letters		AAA
Manufactured	from	10.93
Number of cylinders / valves per cylinder		6 / 2
Displacement	Liters	2.8L
Output	kW @ RPM	128/5800
Torque	Nm @ RPM	235/4200 1)
Bore	∅ mm	81.0
Stroke	mm	90.3
Compression ratio		10.0
Fuel injection / ignition system		Motronic M 2.9
RON	at least	95 unleaded
On Board Diagnostic (OBD)		Yes
Catalytic converter		Yes
Oxygen sensor control		Yes
Exhaust Gas Recirculation (EGR)		No
Exhaust turbocharging system		No

1) 240 Nm when using Super plus unleaded RON 98

) with catalytic converter, unleaded

	Engines →	Gas engine
Code letters		ABA
Manufactured	from	03.95
Number of cylinders / valves per cylinder		4/2
Displacement	Liters	2.0L
Output	kW @ RPM	85@5400
Torque	Nm @ RPM	165@3200
Bore	∅ mm	82.5
Stroke	mm	92.8
Compression ratio		9.4:1
Fuel injection / ignition system		Motronic MFI
RON	at least	91 unleaded 1)
On Board Diagnostic (OBD)		Yes
Catalytic converter		Yes *)
Oxygen sensor control		Yes
Exhaust Gas Recirculation (EGR)		Yes
Exhaust turbocharging system		No

1) In exceptional cases, fuel with a RON of at least 91 may be used, although engine performance will be diminished

	Engines →	Diesel engine	Diesel engine

Code letters		AAZ	1Z
Manufactured	from	10.93	10.93
Number of cylinders / valves per cylinder		4 / 2	4 / 2
Displacement	Liters	1.9L	1.9L
Output	kW @ RPM	55/4400	66/4000
Torque	Nm @ RPM	140/2200...2800	202/1900
Bore	∅ mm	79.5	79.5
Stroke	mm	95.5	95.5
Compression ratio		22.5:1	19.5:1
Fuel injection / ignition system		Turbo-Diesel	TDI
CN	at least	49	49
On Board Diagnostic (OBD)		No	Yes
Catalytic converter		Yes	Yes
Oxygen sensor control		No	No
Exhaust Gas Recirculation (EGR)		Yes	Yes
Exhaust turbocharging system		Yes	Yes

Oil change service

Oil change service every 10,000 miles (15,000 Km)

Vehicles with a yearly mileage performance greater than 10,000 miles (15,000 Km)

- sequence of individual service positions has been tested and optimized. Therefore they should be adhered to, to prevent unnecessary work interruptions.
- When malfunctions are found within framework of an oil change service, which require repair measures, inform customer.
- Ask customer whether new wiper blades should be fitted and whether they require "Windshield Clear" G 052 164 (cleaner and anti-freeze) in windshield washer system.

Work to be performed:	**page**
- Dust and pollen filter: Replace filter element	⇒ 01-5, Dust and pollen filter element, replacing
- Toothed belt: Check wear (only TDI engines)	⇒ 01-5, Toothed belt, check wear (TDI engines)
- Fuel filter: Drain water (Vehicles with Diesel engine, which use bio diesel conforming to specification DIN E 51 606 - or use diesel, which does not conform to specification EN 590)	⇒ 01-5, Fuel filter, draining water (Diesel engine)
- Engine oil: Drain, replace oil filter	⇒ 01-5, Engine oil, changing and replacing oil filter
- Disc brake pads front and rear: Check thickness	⇒ 01-5, Brake pads front and rear, checking thickness
- Engine oil: Filling	⇒ 01-5, Engine oil, changing and replacing oil filter

- Service sticker: Note date for next scheduled service (also brake fluid change) on sticker and affix sticker to door beam (B-pillar)

Inspection service

Inspection service every 12 months

- Ask customer whether new wiper blades should be installed and whether they require "Windshield Clear" G 052 164 (cleaner and anti-freeze) in windshield washer system.

- sequence of individual service positions has been tested and optimized. Therefore they should be adhered to, to prevent unnecessary work interruptions.

- work description sequence corresponds with Inspection service work procedure, which is most commonly performed service.

- When malfunctions are found within framework of an inspection service, which require repair measures, inform customer.

Work to be performed	**page**
Electronics	
- Front lights - check function: Parking light, low beam, high beam, fog lights, turn signals, emergency flashers	
- Rear lights - check function: Brake light (also 3rd brake light), tail light, back-up lights, fog light, license plate lights, luggage compartment light, turn signals, emergency flashers	
- Interior and glove compartment lighting, cigarette lighter, horn and warning lamps: Checking function	
- Airbag for driver and passenger: Perform a visual check of airbag units for outer damage	⇒ 01-5, Driver's and front passenger airbags, visual check of airbag units
- On Board Diagnostic (OBD): Check DTC memory of all systems	⇒ 01-5, On Board Diagnostic (OBD), checking DTC memory of all systems
Vehicle exterior	
- Door arrester and securing bolts: Lubricate	⇒ 01-5, Door check straps and securing bolts, lubricate
- Windshield wiper/washer system and headlight cleaning	⇒ 01-5, Windshield wiper/washer system

system: Check function and setting	and headlight cleaning system, checking function
- Windshield wiper blades: Check for damage; check rest position; only for "juddering" wiper blades: Check pitch angle	⇒ 01-5, Windshield wiper blades, check park position and pitch angle
Tires	
- Spare wheel: Check condition, wear pattern, tread depth _____ mm	⇒ 01-5, Checking tire condition, tread wear pattern , filling pressure and tread depth
- Front left tire: Check condition, wear pattern, tread depth _____ mm	⇒ 01-5, Checking tire condition, tread wear pattern , filling pressure and tread depth
- Rear left tire: Check condition, wear pattern, tread depth _____ mm	⇒ 01-5, Checking tire condition, tread wear pattern , filling pressure and tread depth
- Rear right tire: Check condition, wear pattern, tread depth _____ mm	⇒ 01-5, Checking tire condition, tread wear pattern , filling pressure and tread depth
- Front right tire: Check condition, wear pattern, tread depth _____ mm	⇒ 01-5, Checking tire condition, tread wear pattern , filling pressure and tread depth
Vehicle from below	
- Engine oil: Drain or extract; replace oil filter	⇒ 01-5, Engine oil, changing and replacing oil filter
- Engine and components in engine compartment (from below): Visual check for leaks and damage	⇒ 01-5, Engine and components in engine compartment (from above and below), check for leaks and damage
- Transmission, final drive and joint protective bellows/boots: Visual check for leaks and damage	
- Brake system: Visual check for leaks and damage	⇒ 01-5, Brake system, visual inspection
- Brake pads front and rear: Checking thickness	⇒ 01-5, Brake pads front and rear,

	checking thickness
- Exhaust system: Perform visual check for leaks, security and damage	
- Track rod ends: Check play, security and joint boots	⇒ 01-5, Tie rod ends, checking
- Ball joints: Perform visual check of swivel joint boots for leaks and damage	⇒ 01-5, Ball joints, checking
Engine compartment	
- Engine oil: Filling	⇒ 01-5, Engine oil, changing and replacing oil filter
- Engine and components in engine compartment (from above): Visual check for leaks and damage	⇒ 01-5, Engine and components in engine compartment (from above and below), check for leaks and damage
- Windshield wipe-/wash system: Top-up with fluid G 052 164	⇒ 01-5, Check freeze protection protection content of windshield wiper/washer system, top off if necessary
- Cooling system: Checking freeze protection and coolant level	⇒ 01-5, Cooling system anti-freeze protection and coolant level, checking
Specification 13 ° F (-25 ° C) (in countries with arctic climate -31 ° F (-35 ° C)) / actual value(measured value): ____ ° F (° C)	
- Dust and pollen filter: Replace filter element	⇒ 01-5, Dust and pollen filter element, replacing
- Toothed belt: Check wear	⇒ 01-5, Toothed belt, check wear (TDI engines)
(only TDI engines)	
- Air cleaner: Clean housing and replace filter element	
(every 2 years or every 60,000 km - whichever occurs first)	
- Fuel filter: Drain water	⇒ 01-5, Fuel filter, draining water (Diesel engine)
(Diesel engine)	
- Change brake fluid / additional work as a separate charge!	⇒ 01-5, Brake fluid, changing
(every 2 years)	
- Brake fluid level (depending on brake pad wear): Checking	⇒ 01-5, Brake fluid level, checking

- Battery: Checking	⇒ 01-5, Battery, checking
- Idle speed: Checking (Vehicles with Diesel engine code AAZ, on which no emissions test has been performed)	⇒ 01-5, Idle speed (Diesel engine code AAZ): Checking
Final work procedures	
- Tire filling pressure at all 4 wheels and spare wheel: Checking	⇒ 01-5, Checking tire condition, tread wear pattern , filling pressure and tread depth
- Headlight setting: Checking	⇒ 01-5, Headlight setting, checking
- Service sticker: Note date for next scheduled service (also brake fluid change) and affix sticker to driver's-side door beam (B-pillar)	
- Road test vehicle	⇒ 01-5, Road test, performing

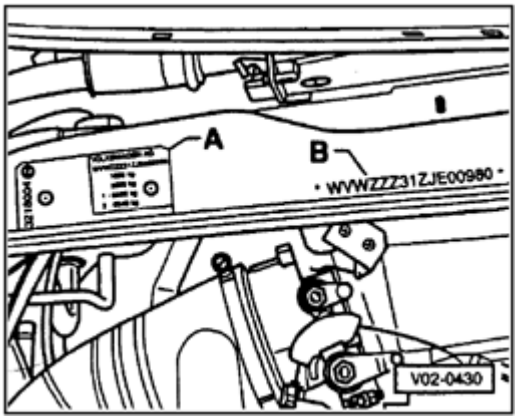
) Applicable only for countries where there are no country specific mandatory exhaust emission regulations.

Inspection service every 20,000 miles (30,000 km)

- Ask customer whether new wiper blades should be fitted and whether they require "Windshield Clear" G 052 164 (cleaner and anti-freeze) in windshield washer system.
- Check First aid box storage life date has not been exceeded. If this is case, ask customer whether First Aid box should be replaced.
- Sequence of individual service positions has been tested and optimized. Therefore they should be adhered to, to prevent unnecessary work interruptions.
- Work description sequence corresponds with Inspection service work procedure, which is most commonly performed service.
- When malfunctions are found within framework of an inspection service, which require repair measures, inform customer.

) Applicable only for countries where there are no country specific mandatory exhaust emission regulations.

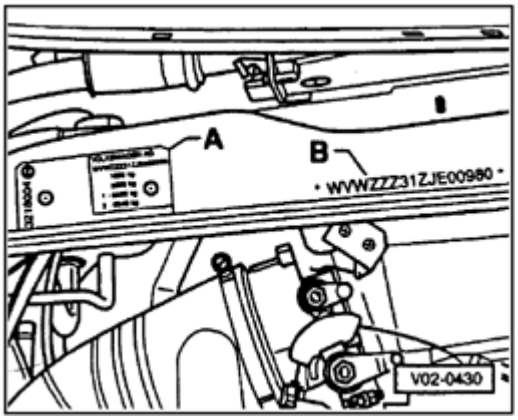
General Information



Type plate

A - Type plate

- Located on front lock carrier plate.



Vehicle Identification Number (VIN)

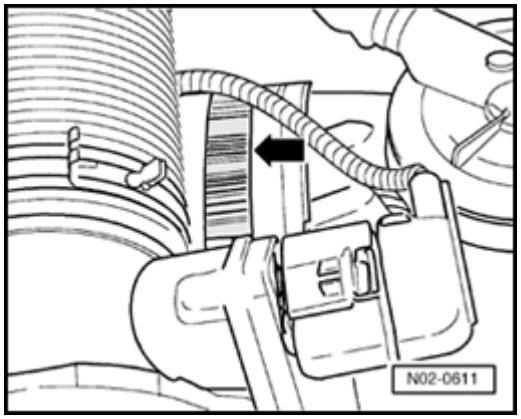
B - Vehicle Identification Number (VIN)

- It is stamped on rear engine compartment bulkhead and is visible through a window in plenum chamber cover.

Meaning of Vehicle Identification Number (VIN):

WVW	ZZZ	3A	Z	R	E or B	000 001
Manufacturer's mark	Filler characters	Model	Filler characters	Model year 1994	Production location	Serial number

Engine code and engine number



Engine code and engine number can be found fastest on sticker **- arrow -** on toothed belt guard (4-cyl.-engine) or on left valve cover (6-cyl.-engine).

Vehicle, lifting

Caution!

- ***Vehicle may only be lifted at points indicated in illustration in order to avoid damaging vehicle floor pan and to prevent vehicle from tipping.***
- ***Never start engine and engage a gear with vehicle lifted so long as even one wheel has contact with floor. There is a risk of an accident if this is not observed!***
- ***If work is to be performed under vehicle it must be supported by suitable stands.***

Floor jack:

In order to prevent damage to vehicle underbody, a suitable rubber or wood liner must be used.

Vehicle must never be lifted on engine oil pan, transmission, rear axle, front axle or bottom sill. Serious damage can occur.

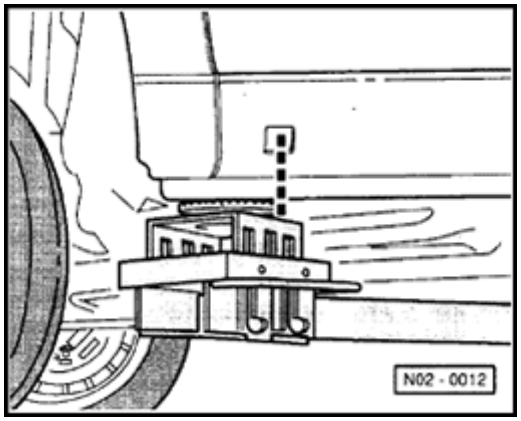
Workshop hoist:

Before driving onto hoist, make sure weight of vehicle does not exceed permissible hoist capacity.

Lift points for workshop hoists and floor jacks:

Front:

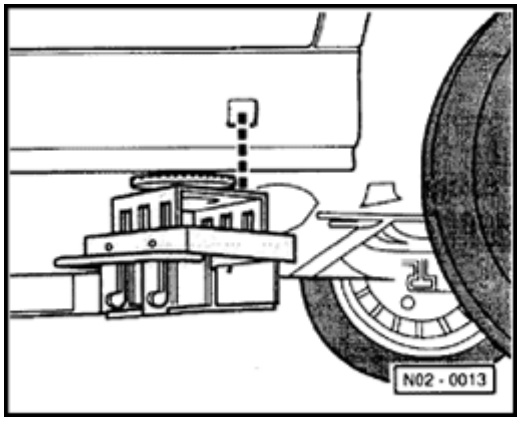
At reinforcing plate welded to floor panel.



Position support so rear edge aligns with center of sill depression.

Rear:

At reinforcing plate welded to floor panel.



Position support so rear edge aligns with center of sill depression.

Caution!

Do not lift vehicle on vertical sill reinforcement or damage to vehicle could result.

Tow starting/towing

A towing eyelet must be screwed into front right bumper beforehand in order to be able to tow vehicle. towing eyelet is supplied with vehicle tool kit.

- Using a screwdriver, pry out cover toward front and remove.

- Screw in towing eyelet to stop and tighten using lug

wrench.

- After use, unscrew towing eyelet and store with vehicle tool kit. Re-install cover.

Rear towing eyelet is located at right in bumper and is covered by a flap.

- To open flap, pull flap downward and let it hang freely.

- To close flap, first insert at bottom and press upward until it engages.

***Note**:*

- *Tow-ropes or bars should be attached at above mentioned points only.*
- *Tow-rope should be able to stretch to reduce risk of damage to both vehicles. It is advisable to use synthetic fiber ropes or ropes of similar elastic material only. However, it is safer to use a tow-bar!*
- *Avoid excessive towing effort and do not jerk. During towing operations on unsurfaced roads there is always a danger that attachment points will be overstressed and damaged.*
- *Battery from another vehicle should be used for starting if possible before trying to start an engine by towing.*

If vehicle has to be tow started or towed once

Note following:

- Regulations concerning towing must be observed.
- Both drivers must be familiar with specifics of towing procedures. Inexperienced drivers should not attempt to tow start or tow.
- When using a tow rope driver of towing vehicle must engage clutch very gently when driving off and changing gear.
- Driver of vehicle being towed must make sure that tow rope is always tight.
- Emergency lights must be switched on both vehicles - unless local regulations differ.

- Ignition must be switched on so that steering wheel is free and turn signals, horn and if necessary windshield wiper and washer can be used.
- Because brake booster only works when engine is running, more pressure is required accordingly on brake pedal when engine is not running.
- In vehicles with Power Assisted Steering (PAS), more force must be used to steer when engine is not running.
- When there is no lubricant in a manual transmission or automatic transmission, vehicle may only be towed with driving wheels lifted.

Important notes concerning tow starting a vehicle:

It is generally recommended not to tow start vehicle.
Instead jump leads should be used.

Other reasons against tow starting a vehicle:

- During tow starting, risk of an accident occurring is high, e.g. driving into vehicle towing.
- Vehicles with gasoline engines can be damaged by unburned fuel entering catalytic converter.
- Tow starting vehicles with an automatic transmission is for technical reasons not possible.

When tow starting vehicles with manual transmission, always note following:

Caution!

During tow starting, vehicles up to and including 1.6L displacement, risk of an accident occurring is high, e.g. driving into towing vehicle . For this reason, a jump lead should be used for these vehicles.

- Before tow starting, engage 2nd or 3rd gear.

- Switch ignition on .

- As soon as engine starts, depress clutch and shift into neutral to avoid running into towing vehicle.

***Note**:*

- *For vehicles with catalytic converter (gasoline engines only), engine with catalytic converter at operating*

temperature must not be tow started over a long distance, otherwise unburned fuel reaches catalytic converter and can be burned there. This may cause catalytic converter to overheat.

When towing a vehicle with automatic transmission following additional points must be observed:

- Selector lever in "N" position.
- Do not tow vehicle faster than 30 mph (50 km/h).
- Do not tow further than 30 miles (50 km).
- If towing over greater distances, vehicle must be suspended at front.

Reason: When engine is not running transmission oil pump is not working and transmission is not adequately lubricated for high speeds or long distances.

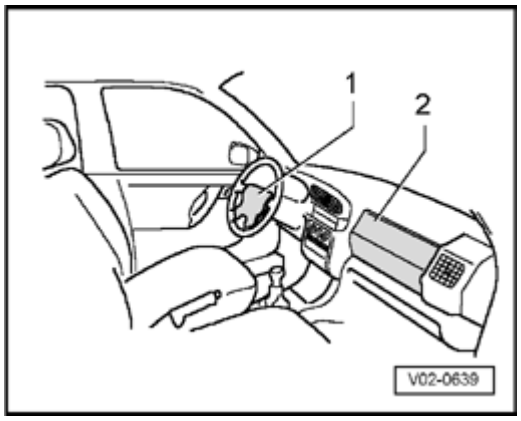
Using a breakdown vehicle, vehicle may only be towed suspended at front.

Reason: If given a rear suspended tow, drive shafts turn backward. planetary gears in automatic transmission then turn at such high speeds that transmission will be severely damaged in a short time.

Work descriptions

Driver's and front passenger airbags, visual check of airbag units

You can see whether an airbag(s) is installed by inscription "AIRBAG" on steering wheel padded panel (driver's side) and on far side of dash panel (passenger side).



- Perform visual check of pad panel **- 1 -** and surface of instrument panel, right side **- 2 -** for exterior damage.

Caution!

- ***Steering wheel padded panel surface must not have stickers attached or be covered or be otherwise modified. This ensures that future function of airbag is guaranteed. Make sure customer is aware of these instructions.***
- ***Steering wheel padded panel must only be cleaned with a dry cloth or a cloth moistened with water.***

On Board Diagnostic (OBD), checking DTC memory of all systems

Interrogating DTC memory can be performed using one of two methods:

- using Scan Tool (ST) V.A.G 1551/ ⇒ 01-5, Interrogating DTC memory of all systems with scan tool VAG 1551:

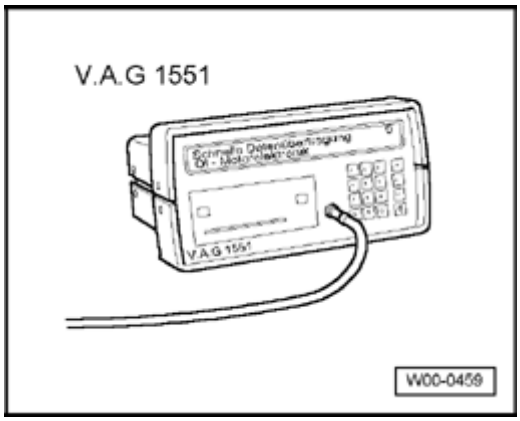
or the

- Vehicle Diagnostic, Test and Information System VAS

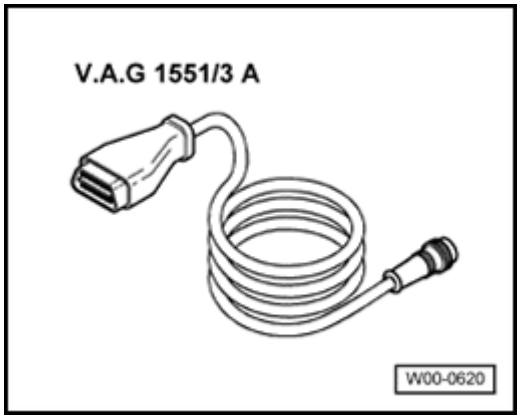
5051/ ⇒ 01-5, Checking DTC memory of all systems using Vehicle Diagnosis, Testing and Information System VAS 5051: .

Interrogating DTC memory of all systems with scan tool VAG 1551:

Required special tools and equipment



- VAG1551 Scan Tool (ST) V.A.G 1551/



- adapter cable V.A.G 1551/3 A

Connecting scan tool VAG 1551:

Perform following work procedure:

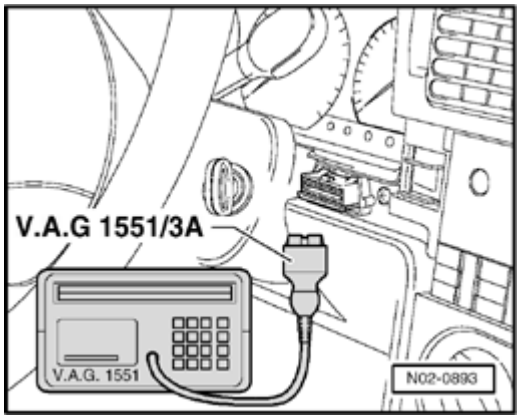
- Engage parking brake.

- Automatic transmission: Shift selector lever into position "P" or "N" .

- Manual transmission: Shift gear stick in neutral.

With ignition switched off, connect Scan Tool (ST) V.A.G 1551/ as follows:

- Unclip cover below instrument cluster.



- With ignition switched off, connect Scan Tool (ST) V.A.G 1551/ using Adapter cable V.A.G 1551/3 A .

Interrogating DTC memory:

- Start engine and let run at idle.

- Switch printer on via Print button (indicator lamp in button lights up).

Indicated on display:

VAG - On Board Diagnostic (OBD) HELP
1- Rapid data transfer*

or

VAG - On Board Diagnostic (OBD) HELP
2- Blink code output*

* is displayed alternately

- Press button **- 1 -** to select "Rapid data transfer" operating mode.

Indicated on display:

Rapid data transfer HELP
Enter address word XX

- Press buttons **- 0 -** and **- 0 -** for address word "Automatic test sequence" .

Indicated on display:

Rapid data transfer Q
00 - Automatic test sequence

When a control module responds with its identification, display indicates number of stored errors or indicates "no malfunction recognized" .

DTCs stored in system are indicated in sequence and printed out. Then VAG1551 Scan Tool (ST) V.A.G 1551/ sends next address word.

Automatic test sequence has ended when following indication appears on display:

VAG - On Board Diagnostic (OBD) HELP

1- Rapid data transfer*

or

VAG - On Board Diagnostic (OBD) HELP

2- Blink code output*

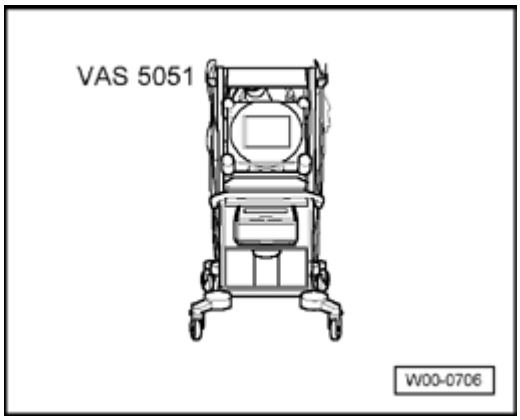
* is displayed alternately

- Switch ignition off.

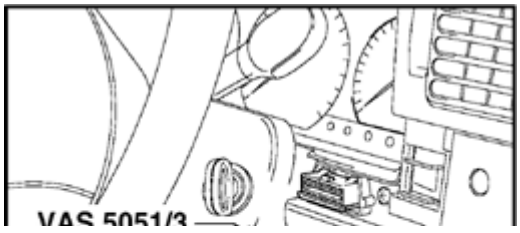
If malfunctions are stored then a repair measure is required. Pass malfunction protocol on for repair.

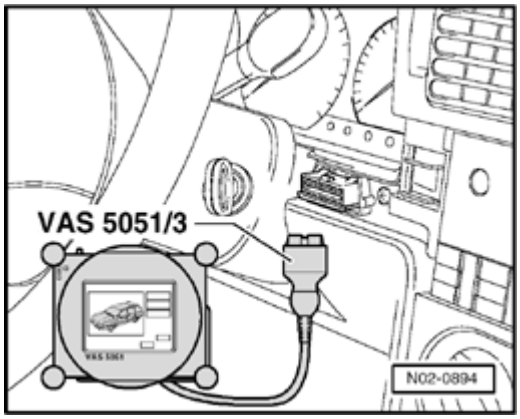
Checking DTC memory of all systems using Vehicle Diagnosis, Testing and Information System VAS 5051:

Required special tools and equipment



- Vehicle Diagnostic, Test and Information System VAS 5051/



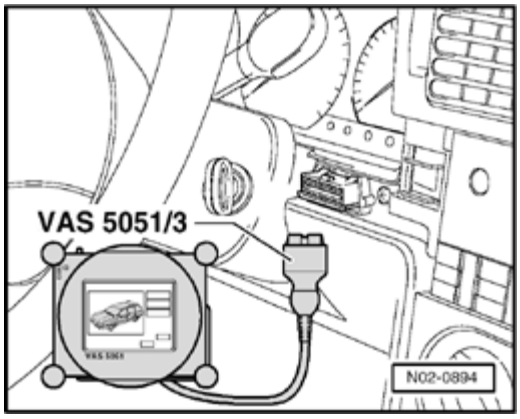


- Diagnostic cable, 5m without voltage supply VAS 5051/3

Connect VAS 5051 tester:

- Engage parking brake.

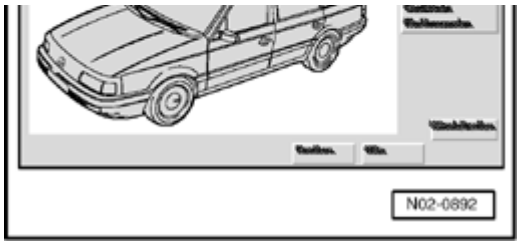
- Manual transmission: Shift gear stick in neutral.



- With ignition switched off, connect Vehicle Diagnostic, Test and Information System VAS 5051/ using diagnostic cable, 5m without voltage supply VAS 5051/3 .

Check DTC memory:

- Switch ignition on .



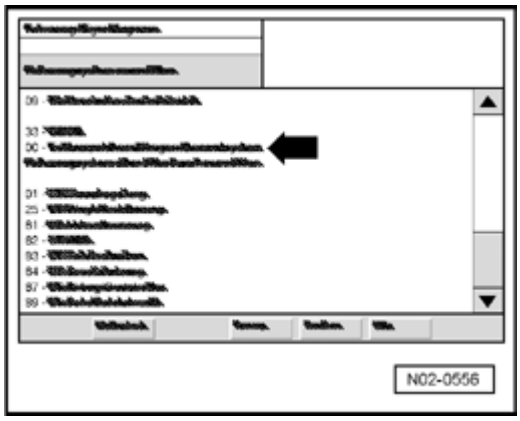
Indicated on display:

Select operating mode:

- Press button for "vehicle On Board Diagnostic (OBD)" on display **- arrow -** .

***Note**:*

- *If indications shown in work procedure are not indicated on display: ⇒ User manual for VAS5051 tester*



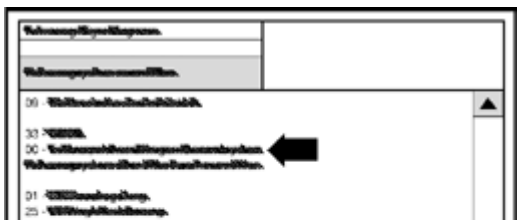
Indicated on display:

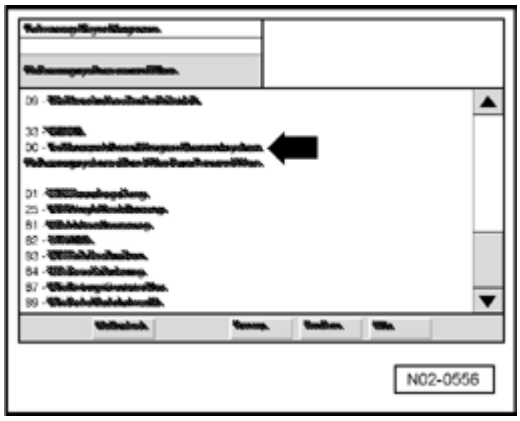
Select vehicle system:

- Press "00 - Check DTC memory, complete system" on display **- arrow -** .

- VAS5051 tester VAS 5051/ sends all known address words in sequence.

When a control module responds with its identification, display indicates number of stored errors or indicates "no malfunction recognized" .





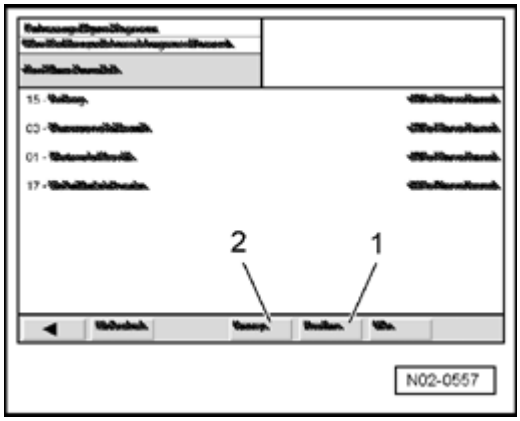
Any system malfunctions that are stored will be displayed one after other. Next, Vehicle Diagnostic, Test and Information System VAS 5051/ sends next address word.

Automatic test sequence has ended when following indication appears on display:

- Press "Print" button **- 1 -** on display and then press "Screen" in print menu.

Vehicle Diagnostic, Test and Information System VAS 5051/ prints out all malfunctions or "0 malfunctions detected" . If malfunctions are stored then a repair measure is required. Pass malfunction protocol on for repair.

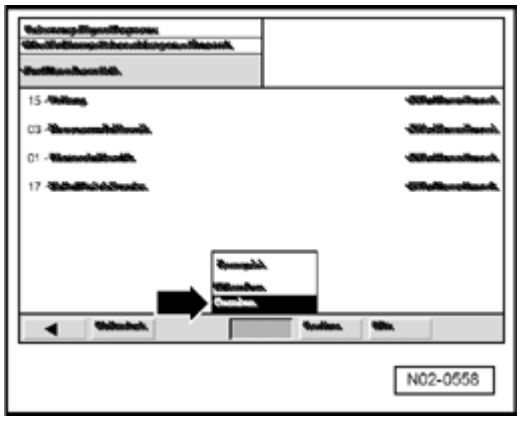
- Press "Go to" button **- 2 -** on display.



Indicated on display:

- Press "End" button **- arrow -** on display.

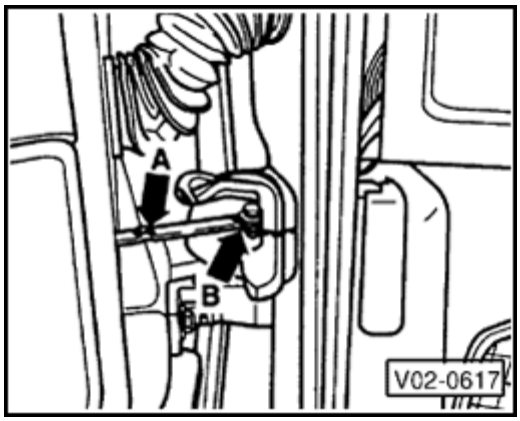
- Press "Exit" button in exit menu.



- Switch off ignition and disconnect diagnostic connector.

Door check straps and securing bolts, lubricate

- Lubricate side area of door arrester **- arrow A -** using lubricant G 000 150.

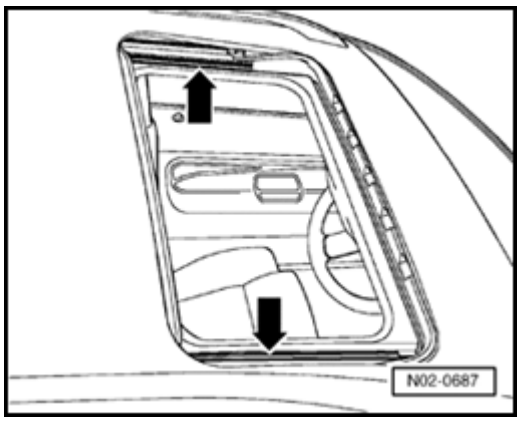


- Lubricate securing bolts **- arrow B -** using lock cylinder grease spray G 400 01.

Sunroof, checking function, cleaning and lubricating guide rails

Perform following work procedure:

- Check function of sunroof.



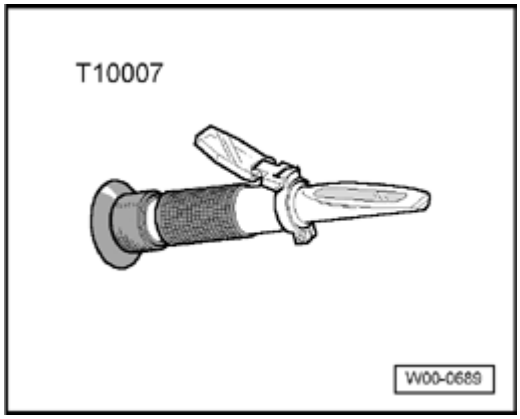
- Clean guide rail **- arrows -** and lubricate using lubricant G 000 450 02.

Windshield wiper/washer system and headlight cleaning system, checking function

***Note**:*

- *If during function test it is determined that wiper blades are juddering or making noises, check pitch angle of wiper blades ⇒ 01-5, Windshield wiper blades, check park position and pitch angle .*

Required special tools and equipment



- Refractometer T10007

Check freeze protection protection content of windshield wiper/washer system, top off if necessary

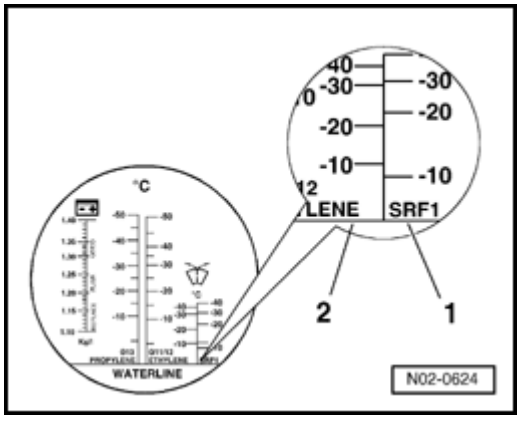
Checking freeze protection protection concentration:

Read bright/dark boundary to obtain an accurate reading for

following tests. Place a drop of water on glass to improve readability of bright/dark boundary. bright/dark boundary can be clearly recognized on "WATERLINE" .

- Check concentration of anti-freeze additive using refractometer T10007 (follow user manual).

Scale **- 1 -** of refractometer is designed specifically for genuine Volkswagen Windshield Clear "G052164" .



Scale **- 2 -** is designed for commercially available windshield cleanser as well as a mixture of commercially available windshield cleanser and "G052164" .

Mixture ratio:

Freeze protection to	Windshield Clear G 052 164	Water
1 /0.5 ° F (-17/-18 ° C)	1 part	3 parts
-7.5/-9.5 ° F (-22/-23 ° C)	1 part	2 parts
-34.5/-36.5 ° F(-37/-38 ° C)	1 part	1 part

Topping-off with fluid:

Windshield wash/wipe system fluid reservoir must be filled up to edge.

Use only "Genuine Volkswagen Windshield Clear" all-year-round when topping-up windshield wash/wipe system.

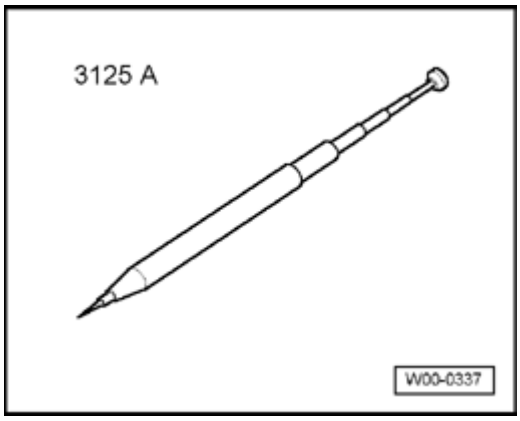
***Note**:*

- *Genuine Volkswagen Windshield Clear "G 052 164" protects spray nozzles, fluid reservoir and hoses from freezing.*
- *Fill with genuine Volkswagen Windshield Clear "G 052 164" in warmer season also. powerful cleanser removes wax and oil deposits from windows.*

- *Freeze protection must be guaranteed to approx. 5 ° F (-15 ° C) (approx. -31 ° F (35 ° C) in countries with an arctic climate) in windshield washer system.*

Windshield washer system, check jet setting and adjust if necessary

Required special tools and equipment

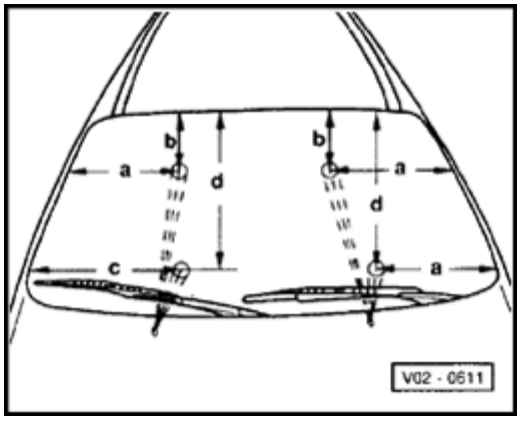


- V.A.G3125A

***Note**:*

- *Never use a needle or a similar object, since it may damage water hoses in spray nozzle!*
- *Windshield wash/wipe system fluid reservoir must be filled up to edge.*

- Check jet setting, adjust using V.A.G3125A adjustment tools for windshield wiper nozzle if necessary.



Jet adjustment setting dimensions for windshield:

a	400 mm	c	520 mm

b	300 mm	d	600 mm

Tolerance: ± 20 mm

Jet setting dimension for rear window:

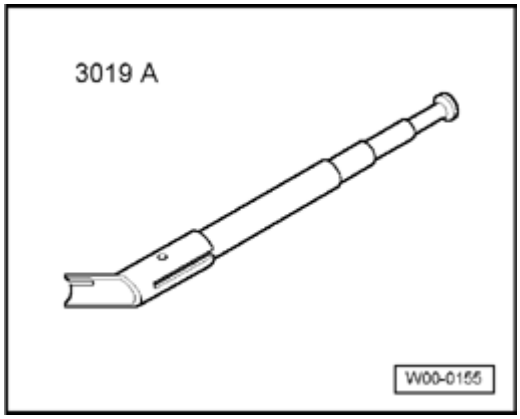
Spray jet, center, wiper area

***Note**:*

- *If spray jet is uneven or cannot be adjusted to specified dimensions, spray nozzle must be replaced (repair measure).*

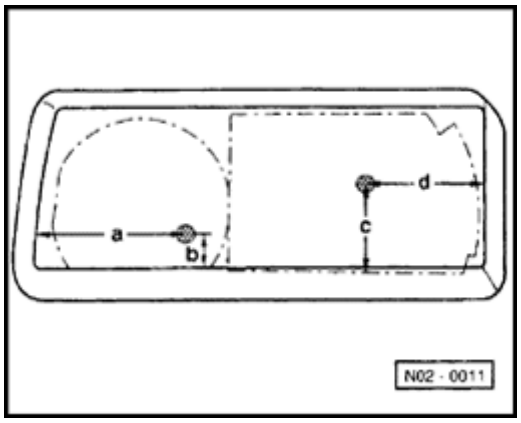
Headlight cleaning system, check jet setting and adjust if necessary

Required special tools and equipment



- 3019A adjustment device

- Check jet setting, adjust using 3019A adjustment device if necessary.

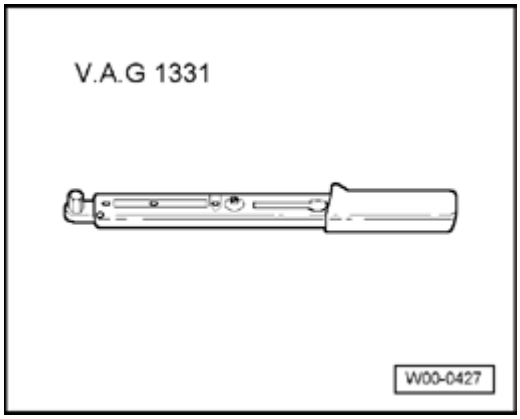


Following jet setting dimensions apply for left headlight (right headlight symmetrical)

Windshield wiper blades, check park position and pitch angle

Windshield wiper blades, check park position and adjust if necessary

Required special tools and equipment



- Torque wrench V.A.G 1331/ (5 - 50 Nm)

Perform following work procedure:

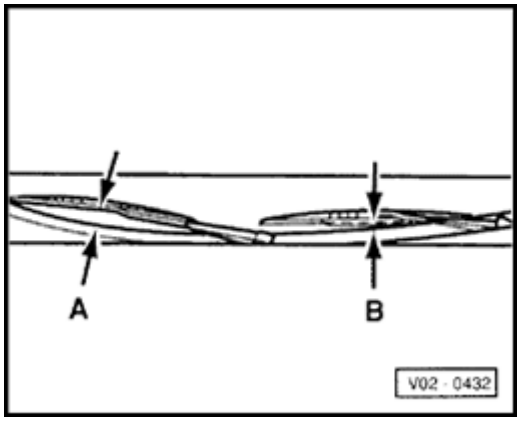
- Check whether wiper blades are in park position.

Windshield:

- A - = 50 mm

- B - = 35 mm

- If necessary, adjust rest position by shifting wiper arms.

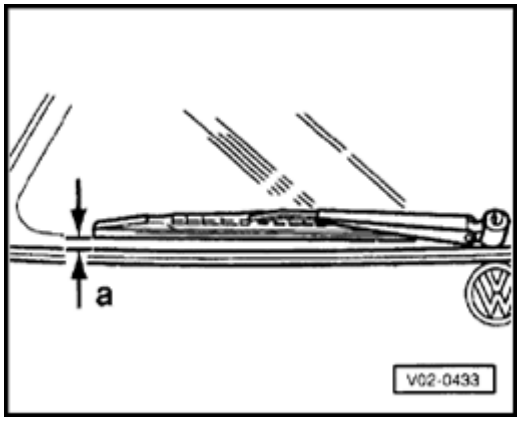


Tightening torque, wiper arms: 20 Nm

Rear window (Wagon):

- a - = 20 mm

- If necessary, adjust park position by shifting wiper arm.



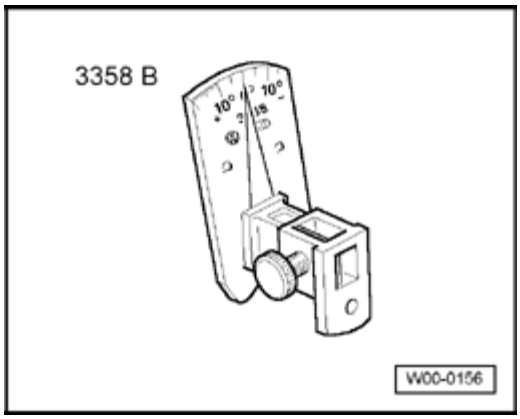
Tightening torque, wiper arm: 16 Nm

Windshield wiper blades: Check pitch angle, adjust if necessary

***Note**:*

- *Check pitch angle only if wiper blades are juddering or making noises.*

Required special tools and equipment



- Windshield wiper adjustment device VAS 3358B
- Open-end wrench 24 mm

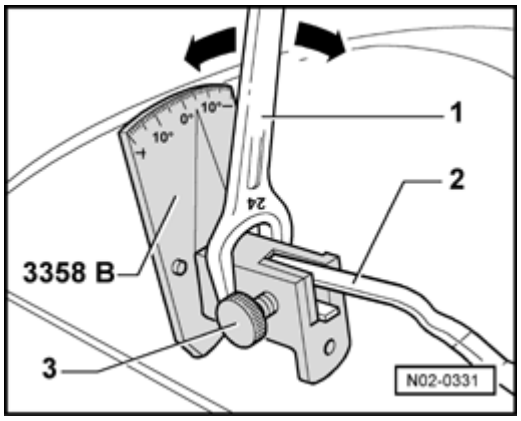
Perform following work procedure:

- Bring windshield wiper arms in park position.

- Remove windshield wiper blade.

- Install windshield wiper arm **- 2 -** into Windshield wiper adjustment device VAS 3358B and secure using mounting

screw **- 3 -** .



- Check pitch angle.

Pitch angle (specified values) for	
Driver's side	-2.5 ° / -4 ° 1)
Passenger's side	0 °
Rear wiper	0 °
Tolerance	± 2 °

1) Windshield wiper blade with plastic spoiler (vehicles from 05.94 on)

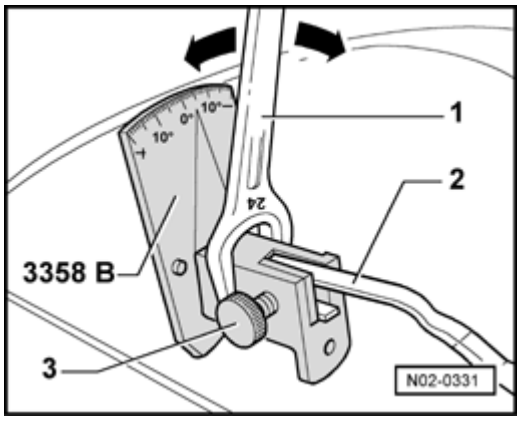
If necessary, adjust pitch angle to specified value as follows:

- Place open-end wrench 24 mm **- 1 -** onto adjustment device and set windshield wiper arm **- 2 -** to specified value **- arrows -** .

- Remove windshield wiper arm **- 2 -** from adjustment device and secure again using mounting screw **- 3 -** .

- Check adjusted value according to table. If necessary, repeat setting and checking procedure until specified value is reached.

- Remove adjustment device and install windshield wiper blade.



- Check to make sure that windshield wiper system is not juddering.

Checking tire condition, tread wear pattern , filling pressure and tread depth

***Note**:*

- *For reasons of safety only tires of same type and tread pattern should be fitted on a vehicle!*

***Note**:*

- *Vehicle must be equipped with tires of same make. Otherwise, This can cause damage because viscous clutch would unnecessarily increase ratio of rear final drive due to rising RPM difference of both axles.*
- *However, different tread depths of front axle and rear axle tires, e.g. due to wear, is harmless. It is recommended, however, to mount tires with greater tread depth in front.*
- *If front wheels are more strongly worn out than rear wheels, they have a smaller rolling circumference and turn therefore faster.*
- *Thus tensions in drivetrain rise and tires wear faster.*

Inspection service:

- Check tires for scuffing, one sided wear, porous side walls, cuts and fractures. It is essential that detected defects are communicated to customer!

Checking tire wear pattern

Tread wear pattern on front tires is an indication of whether toe and camber settings should be checked:

- "Feathering" on tread indicates incorrect toe setting. .
- If tread is worn on one side, this is usually caused by incorrect camber. .

When wear of this nature is noticed, determine cause by performing alignment checks (repair measure).

Tire tread depth (including spare wheel), checking

- Check tread depth

Minimum depth: 1.6 mm

***Note**:*

- *This value may vary for individual countries due to different legislative regulations.*
- *minimum tread depth is reached when tires have worn down level with 1.6 mm high tread wear indicators positioned at intervals around tire.*
- *If tread depth is approaching legal minimum permissible depth, customer must be informed.*

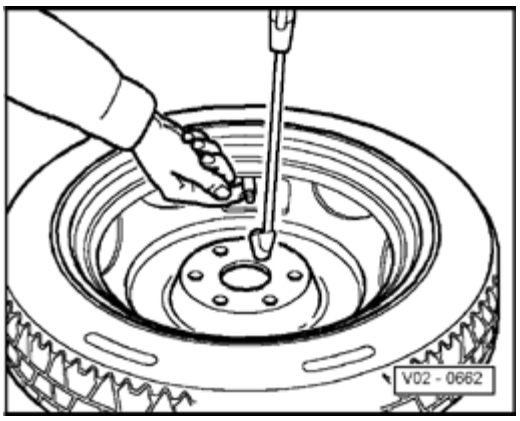
Tire inflation pressure (including spare wheel), checking, correcting inflation pressures

Required special tools and equipment

- Tire pressure gauge

***Note**:*

- *Spare wheels with a rectangular opening in wheel disk do not need to be removed. Filler valve must be reached through opening.*
- *Pressures listed in table are valid for cold tires. Do not reduce increased pressures on warm tires.*



- *Important information concerning winter tires recommended by Volkswagen is found in "Fault finding; Wheels, tires; Chapter 4; No. 2" .*

Tire inflation pressure table for normal tires

(For all factory installed tire sizes)

Filling pressure values in bar

	Half load		**Full load**	
	front	**rear**	**front**	**rear**
Vehicles with gasoline engine:				
55 kW and 66 kW				
Sedan:	2.0	2.0	2.2	2.6
Wagon:	2.0	2.0	2.2	2.8
74 kW and 85 kW				
Sedan:	2.2	2.2	2.4	2.7
Wagon:	2.2	2.2	2.4	3.0
110 kW				
Sedan:	2.6	2.6	2.8	3.1
Wagon:	2.6	2.6	2.8	3.4
128 kW				
Sedan:	2.6	2.6	2.8	3.1
Wagon:	2.6	2.6	2.8	3.4
135 kW Synchro				
Sedan:	-	-	-	-
Wagon:	2.6	2.8	2.8	3.4
110 kW				
Sedan:	2.6	2.6	2.8	3.1
Wagon:	2.6	2.6	2.8	3.4
128 kW				
Sedan:	2.6	2.6	2.8	3.1
Wagon:	2.6	2.6	2.8	3.4
Vehicles with Diesel engine:				
55 kW				
Sedan:	2.0	2.0	2.2	2.6

Wagon:	2.0	2.0	2.2	2.8
66 kW				
Sedan:	2.2	2.2	2.4	2.7
Wagon:	2.2	2.2	2.4	3.0
81 kW				
Sedan:	2.4	2.4	2.6	2.9
Wagon:	2.4	2.4	2.6	3.2
Spare wheel:			4.2	
Regular wheel:	Meet highest intended inflation pressure for vehicle.			

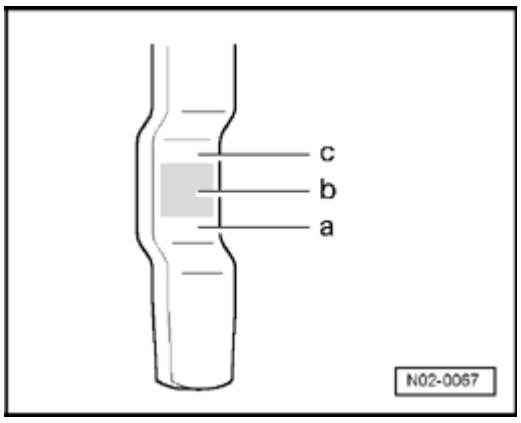
Engine oil level, checking

After switching engine OFF, wait at least 3 minutes to allow oil to flow back into pan.

- Remove dipstick, wipe with a clean cloth and reinsert as far as stop.

***Note**:*

- *Observe disposal regulations!*



- Remove dipstick again and read oil level:

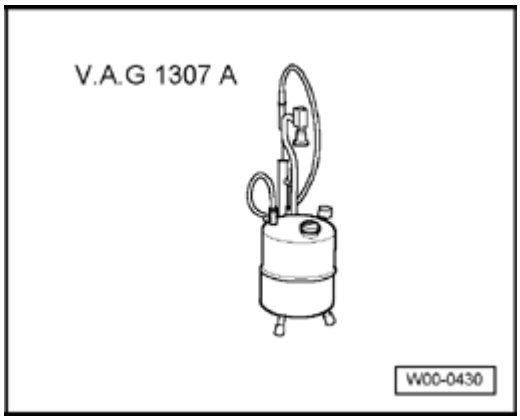
Area a - Oil must be topped off. Afterward, it is sufficient if oil level is somewhere in area - b - .
Area b - Oil need not be topped off.
Area c - Oil must not be topped off.

***Note**:*

- *At an oil level above area **- c -** , there is a danger of damage to catalytic converter.*

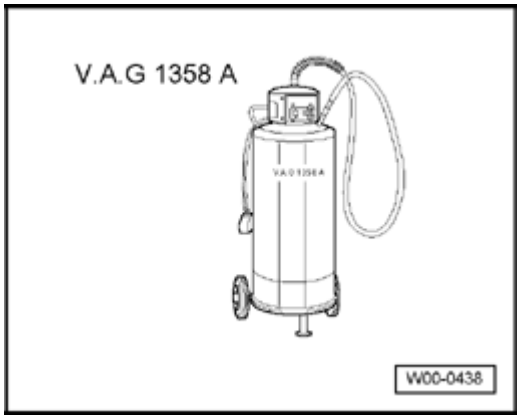
Engine oil, changing and replacing oil filter

Required special tools and equipment

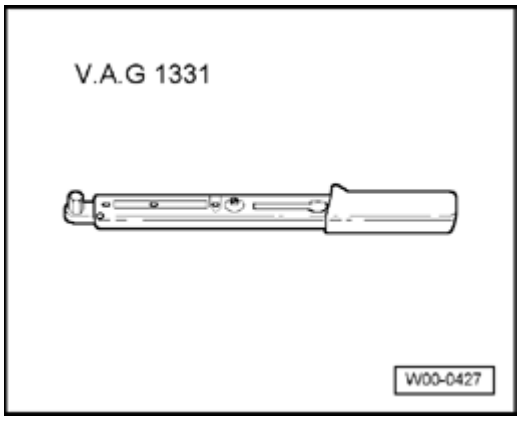


- Oil extractor V.A.G 1307 A

or



- Oil extractor V.A.G 1358 A



- Torque wrench V.A.G 1331/ (5 - 50 Nm)

***Note**:*

- *If oil is drained and not extracted using oil extractor V.A.G 1307 A or oil extractor V.A.G 1358 A , replace gasket for oil drain plug.*
- *Observe disposal regulations!*

Capacities with filter change: ⇒ *for emissions test*

Tightening torque for drain plug:

- 4-cyl. engines: 30 Nm
- 6-cyl. engines: 50 Nm

Oil filter, replacing

4-cyl. engine

***Note**:*

- *Observe disposal regulations!*

- Loosen oil filter using tension strap (e.g. Hazet 2171-1) and remove oil filter.

- Clean engine sealing surface.

- Lubricate rubber seal lightly with oil.

- Install new filter element and tighten hand-tight.

6-cyl. engine

***Note**:*

- *Observe disposal regulations!*

- Drain oil at drain plug.

- Remove filter lower part using tool.

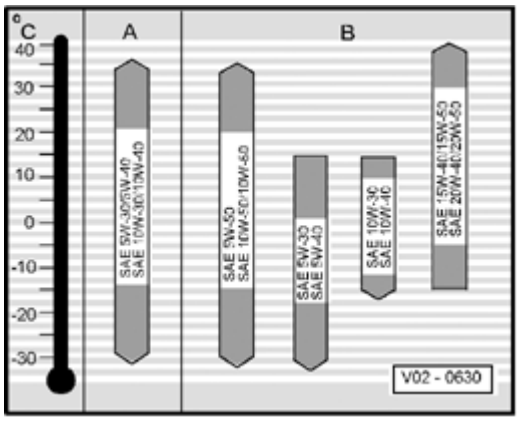
- Install new filter element and new O-ring (oiled).

- Tighten filter lower part with 25 Nm and drain plug with new sealing ring with 10 Nm.

Engine oil, filling

Oil capacities with filter change: ⇒ *Emissions test*

Due to positive properties of oils (⇒ 01-5, Oil properties) use only following approved engine oils:



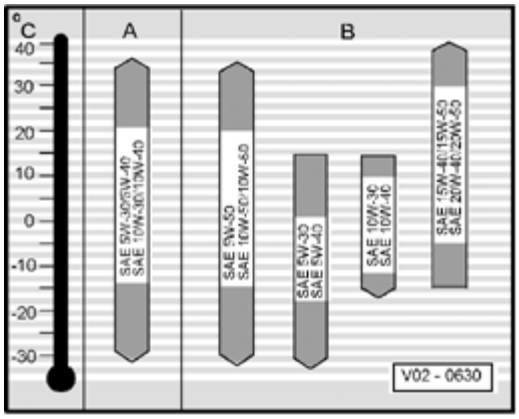
Gasoline engine specifications:

A - Multi-grade light duty oils, specification VW 500 00 or VW 502 00

B - Multi-grade oils, specification VW 501 01

- Multi-grade oils, specification API-SF or SG

)These oils may only be used in exceptional cases if no approved engine oil is available.



Specification for Diesel engines

A - Multi-grade light duty oils, specification VW 500 00

B - Multi-grade oils, specification VW 505 00 (suitable for all Diesel engines without restrictions)

- Multi-grade oils, specification API-CD

- Multi-grade oils, specification VW 501 01

-

Continuation for all engines

Turbo-engines: After engine oil and oil filter are replaced, following must be considered after first engine start:

- As long as oil pressure warning light in instrument panel is lit, engine may run only at idle. Do not accelerate! Throttle bursts may damage turbocharger or cause it to fail completely.

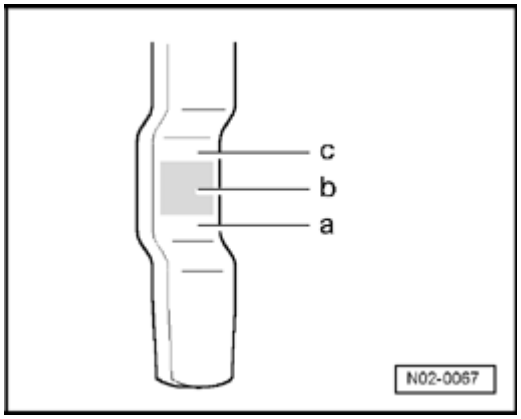
- Only when warning light goes out, full oil pressure is reached, and driver may accelerate.

- After topping off with oil wait at least 3 minutes then check oil level.

- Pull out oil dipstick, wipe off with a clean cloth and re-insert dipstick again up to stop.

***Note**:*

- *Observe disposal regulations!*



- Withdraw dipstick and read oil level:

Area a - Oil must be topped off. Afterward, it is sufficient if oil level is somewhere in area - b - .
Area b - Oil need not be topped off.
Area c - Oil must not be topped off.

***Note**:*

- *At an oil level above area **- c -** , there is a danger of damage to catalytic converter.*

Oil properties

Multi-grade oils conforming to VW standard 501 01 and 505 00 are oils with following properties:

- All-season usability in moderate climate zones.
- Excellent cleanability.

- Secure lubrication properties at all engine temperature and load conditions.
- High resistance to aging.

Multi-grade light duty oils according to VW standard 500 00 exhibit beyond that following advantages:

- All-season usability at almost all occurring outside temperatures.
- Smaller friction losses of engine.
- Optimum cold starting ability, also at very low temperatures.

Multi-grade light duty oils according to VW standard 502 00:

This oil suitable for gasoline engines corresponds to VW standards 501 00, 505 00 as well as 500 00 and additionally exhibits further advantages: It is particularly suitable for application with more strenuous operating conditions, e.g. difficult road conditions, predominant use of trailer, high portion of uphill driving and driving in hot climate zones.

***Note**:*

- *Single-range oils are generally not all year round usable because of their limited viscosity range. These oils should be used therefore only in extreme climate zones.*
- *When using Multi-grade oil SAE 5 W-30, continuously high engine speeds and constant strong load must be avoided. This restriction does not apply to multi-grade light duty oils.*

Engine and components in engine compartment (from above and below), check for leaks and damage

Perform visual check as follows:

- Check engine and components in engine compartment for leaks and damage.

- Check hoses, pipes and connections of

  - Fuel system
  - Cooling and heating system
  - Brake system

For leaks, abrasions, porosity and brittleness.

***Note**:*

- *Make sure that all malfunctions detected are repaired within repair measures.*
- *If fluid losses are greater than can be reasonably expected, determine cause and repair (repair measure)*

V-belt, checking condition and tension

Check condition of V-belt:

- Checking:

  - Sub-surface cracks (cracks, core ruptures, cross sectional breaks)
  - Layer separation (top layer, cord strands)
  - Base break-up
  - Fraying of cord strands
  - Flank wear (material wear, frayed flanks, flank brittleness -glassy flanks-, surface cracks)
  - Traces of oil and grease

***Note**:*

- *It is essential to replace V-belt if malfunctions are found. This will avoid possible break-downs or operating problems. replacement of ribbed belt is a repair measure.*

V-belt tension, checking and adjusting

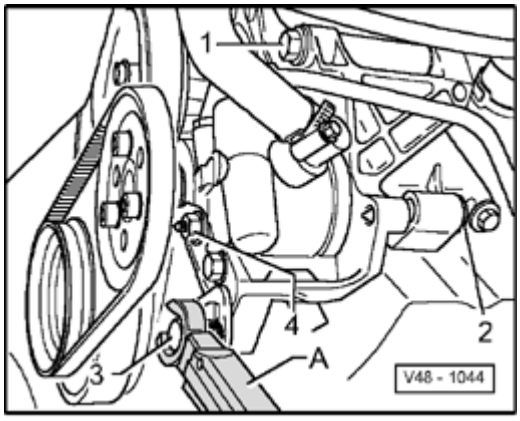
- Check V-belt tension by strong thumb pressure (depth of impression approx. 5 mm) and adjust if necessary.

For following adjustment torque wrench V.A.G 1410/ in connection with ring- insertion tool (A/F 22 mm) V.A.G 1410/2 **- A -** is particularly suitable.

- Loosen bolts **- 1 -** and **- 2 -** , clamping screw **- 3 -** and mounting nut **- 4 -** for clamps (if available) at least one turn.

- Tension V-belt to 4 Nm by turning tension nut using torque wrench (run-in belt), and tighten clamping screw **- 3 -** of tension nut to 25 Nm.

- Tighten mounting bolt **- 1 -** for pump to 45 Nm.



- Tighten mounting bolt **- 2 -** for pump and mounting nut **- 4 -** for clamps (if available) to 25 Nm.

Ribbed belt, Check condition and tension (engines without automatic tensioning roller)

Checking condition of ribbed belt:

- Checking:

- Sub-surface cracks (cracks, core ruptures, cross sectional breaks)
- Layer separation (top layer, cord strands)
- Base break-up
- Fraying of cord strands
- Flank wear (material wear, frayed flanks, flank brittleness -glassy flanks-, surface cracks)

- Traces of oil and grease

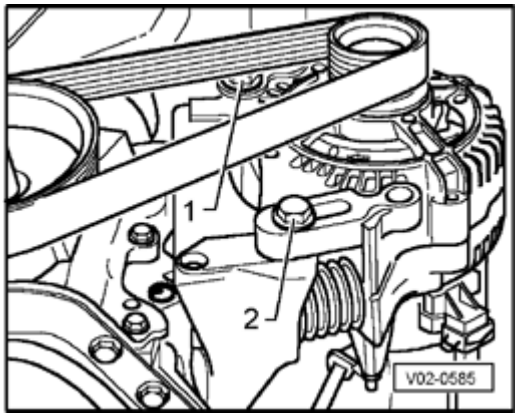
***Note**:*

- *It is essential to replace ribbed belt if malfunctions are found. This will avoid possible break-downs or operating problems. replacement of a ribbed belt is a repair measure.*

Tensioning ribbed belt:

***Note**:*

- *With engines with tensioning roller, stretching of ribbed belt is not required, since by a spring-loading tensioning device correct tension of belt is always ensured.*



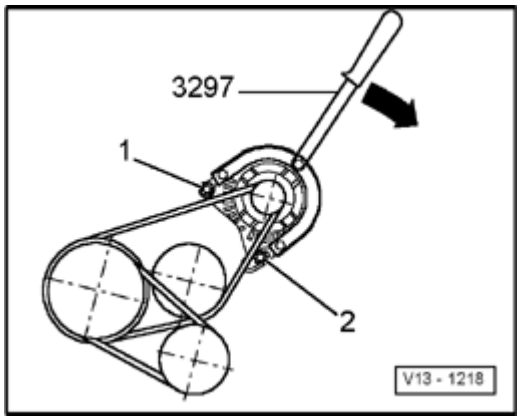
- Loosen mounting bolts **- 1 -** and **- 2 -** for generator at least one turn.

- Press down generator at least three times up to stop using Clamping lever 3297 , in order to ensure optimal freedom of movement.

- With generator still disconnected, let engine run at idle for at least 10 seconds.

***Note**:*

- *Next, note tightening order when tightening bolts for generator. Do not lean on generator and do not touch ribbed belt.*



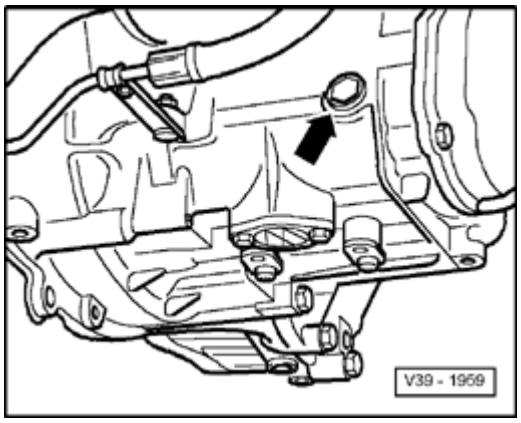
- Tighten first mounting bolt **- 2 -** , then mounting bolt **- 1 -** to 25 Nm.

Front manual transmission/final drive, check oil level

- Remove bolt **- arrow -** .

- Check oil level: Oil level should reach lower edge of oil filler hole.

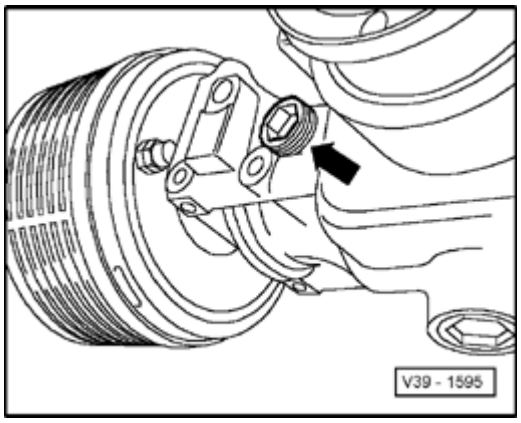
- If necessary, top-up transmission fluid "specification G 50 SAE 75W90 (synthetic oil)" .



- Install bolt **- arrow -** .

Rear final drive (Syncro): Check oil level

Transmission fluid specification G 50 SAE 75W90 (synthetic oil)



- Unthread bolt for checking transmission fluid **- arrow -** .

Oil level is correct when the rear final drive is filled up to lower edge of oil filler hole.

- Screw in bolt **- arrow -** .

When filling anew, note the following:

- Unthread bolt **- arrow -** .

- Top up transmission fluid to lower edge of oil filler hole.

- Screw in bolt **- arrow -** .

Automatic transmission, check final drive oil level

***Note**:*

- *Observe disposal regulations!*

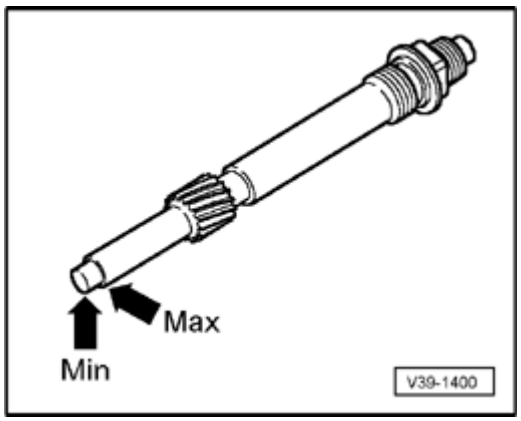
- Remove drive for speedometer, wipe off with a cloth, and install drive again.

- Remove drive and check oil level.

Oil level must be between min. and max. marking.

***Note**:*

- *Oil capacity between min. and max. marking is 0.1L.*



- If oil level is too low, top-off axle oil.

Automatic transmission 096 (until December 1994):

Manufacturing date see side ⇒ 01-5, Transmission identification

SAE 75 W 90 (synthetic)

- Container size 0.5 L - part number G 052 145 A1
- Container size 1.0 L - part number G 052 145 A2

***Note**:*

- *Lubricants SAE 75 W 90 and VW ATF must not be mixed with each other.*

Automatic transmission 01M from January 1995 to 8/24/1996:

Manufacturing date see side ⇒ 01-5, Transmission identification

VW-ATF

- Container size 0.5 L - part number G 052 162 A1
- Container size 1.0 L - part number G 052 162 A2

***Note**:*

- *lubricants SAE 75 W 90 and VW ATF must not be mixed with each other.*

Automatic transmission 01M from 8/25/1996:

Manufacturing date see side ⇒ 01-5, Transmission identification

SAE 75 W 90 (synthetic)

- Container size 0.5 L - part number G 052 145 A1
- Container size 1.0 L - part number G 052 145 A2

***Note**:*

- *lubricants SAE 75 W 90 and VW ATF must not be mixed with each other.*

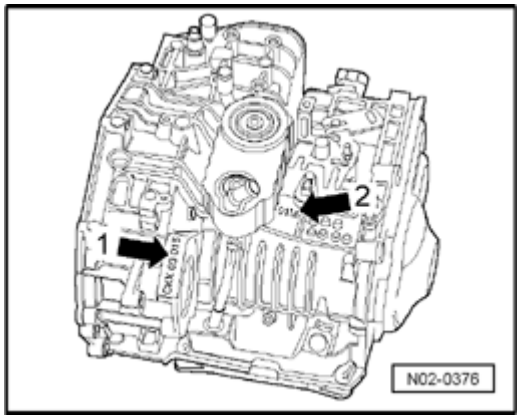
- If oil level is too high, extract oil using Oil siphoning unit V.A.G 1358 A .

- Install drive for speedometer.

Continuation for all vehicles:

Transmission identification

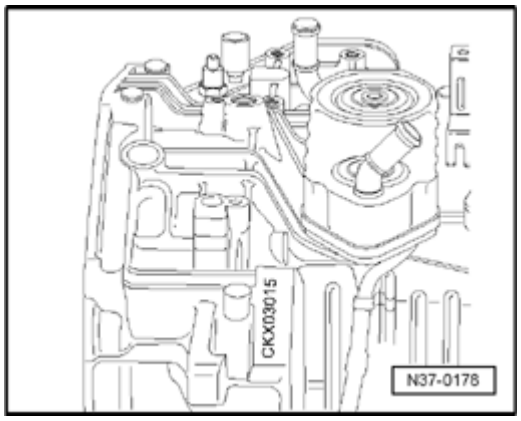
Identification **- arrow 1 -**



Automatic transmission 01M **- arrow 2 -**

Example:

CKX	**03**	**01**	**5**
I	I	I	I
Code letters	Day	Month	Year **- 1995 -** of manufacturing



Transmission code letters are also listed on vehicle data plates.

Brake system, visual inspection

- Master brake cylinder, brake booster (with Anti-lock Brake System -ABS-: Hydraulic unit), Check brake pressure regulator, brake caliper for leaks and damage.

- Make sure that brake hoses are not twisted.

- Make sure that brake hoses do not touch any vehicle components when steering is at full lock.

- Check brake hoses for porosity and brittleness, brake hoses and brake lines for abrasions.

- Check brake connections and mounts for proper seating, leakages and corrosion.

Caution!

Malfunctions found must be repaired (repair measure).

Brake pads front and rear, checking thickness

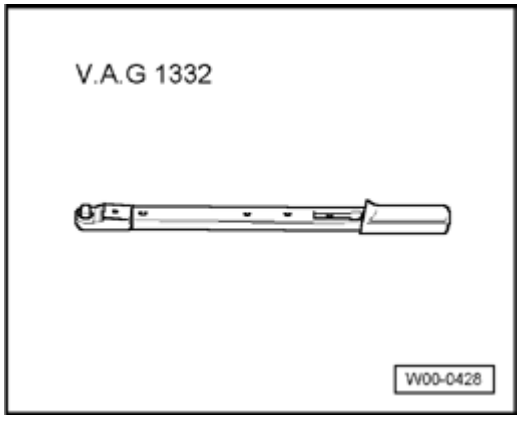
Front disc brake pads:

- Remove a wheel for better judgement of remaining pad thickness. To do so, mark position of wheel in relation to brake disc, and install in same position again after test.

***Note**:*

- *Since pad wear on passenger side can be slightly larger according to experience than on driver's side, it is reasonable to remove front wheel on seat passenger side.*

Required special tools and equipment



- Torque wrench V.A.G 1332/ (40 -200 Nm)
- Fashlight

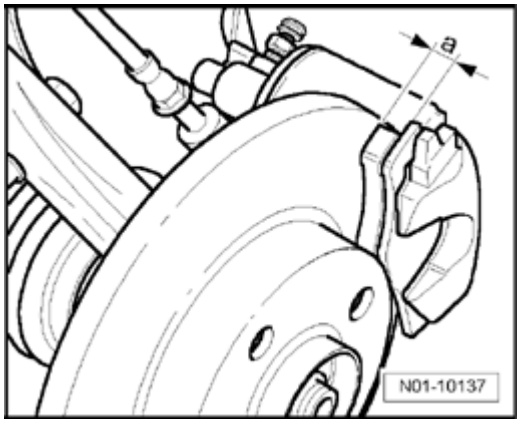
Perform following work procedure:

- Measure outer and inner pad thickness.

a - Pad thickness without backing plate

- Wear limit: 2 mm

With a pad thickness of 2 mm (without backing plate) brake pads have reached their wear limit and must be replaced (repair measure).



- Mount wheel and tighten wheel securing bolts to 110 Nm.

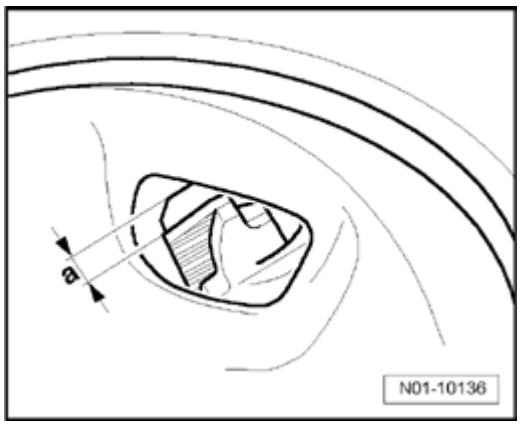
Rear disc brake pads:

- Determine thickness of outer pad by visual check (using a flashlight through a hole in wheel).

- Determine thickness of inner pad by visual check (using a flashlight through a hole in wheel).

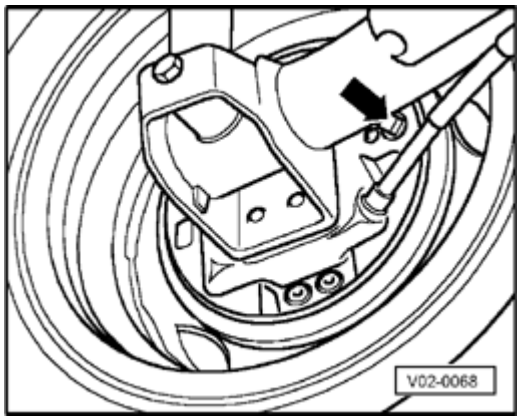
a - Pad thickness including backing plate

- Wear limit: 2 mm



With a pad thickness of 2 mm (without backing plate) brake pads have reached their wear limit and must be replaced (repair measure).

Rear drum brake pads:



- Check thickness of brake pads through inspection holes in brake carrier metal sheets **- arrow -** .

- Wear limit: 2.5 mm (only pad thickness)

***Note**:*

- *Pay attention to pads smeared with brake fluid or fat.*

Underbody sealant, checking

When performing visual inspection for damage to underbody sealant, also check underbody, wheel housings and sill panels.

***Note**:*

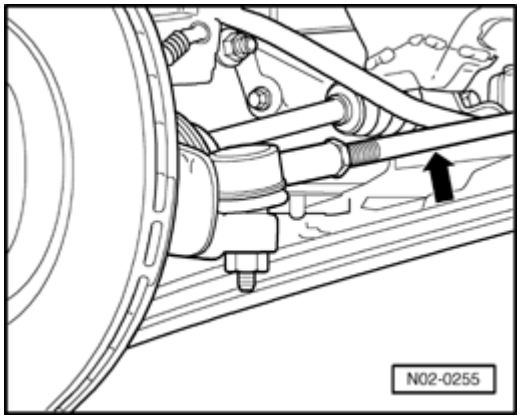
- *Malfunctions found must be repaired (repair measure). This inhibits corrosion and rusting through.*

Tie rod ends, checking

Perform following work procedure:

- With vehicle raised (wheels hanging free), check play by moving tie rods and wheels **- arrow -** . Play: zero play

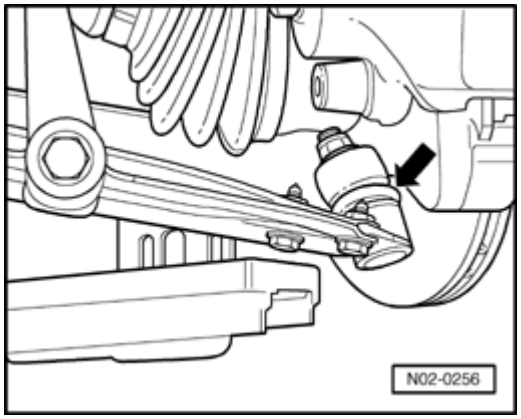
- Check mountings.



- Check joint boots for damage and proper seating.

Ball joints, checking

Perform following work procedure:



- Check joint boots **- arrow -** of ball joints for leaks and damage.

Cooling system anti-freeze protection and coolant level, checking

Make sure that coolant additive G 12 (color red) can be already filled in. When adding coolant, use only coolant G

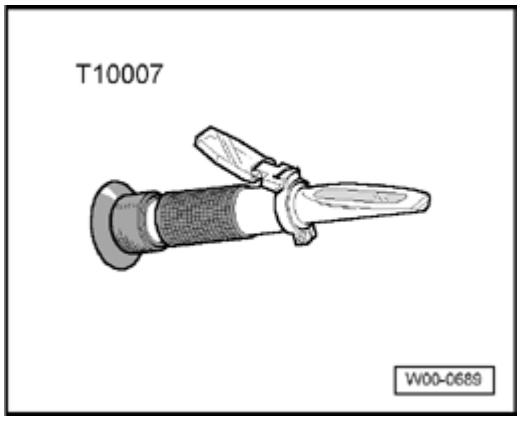
12 according to TL "VW 774 D" .

Some vehicles are filled with coolant additive G 11 (color green). When adding coolant, use only coolant G 11 according to TL "VW 774 D" . If these vehicles were filled with G 12 for repairs, only G 12 may be refilled.

Caution!

- ***Coolant additives G 11 and G 12 must never be mixed.***
- ***If fluid in expansion tank is brown, G12 or G 11 has been mixed with another coolant additive. In this case, coolant must be replaced immediately (repair measure)! If coolant is not changed, serious malfunctions or damage to engine can occur!***

Cooling system anti-freeze protection and coolant level, checking



Required special tools and equipment

- Refractometer T10007

***Note**:*

- *Read bright/dark boundary to obtain an accurate reading for following tests. Place a drop of water on glass to improve readability of bright/dark boundary. bright/dark boundary can be clearly recognized on "WATERLINE" .*

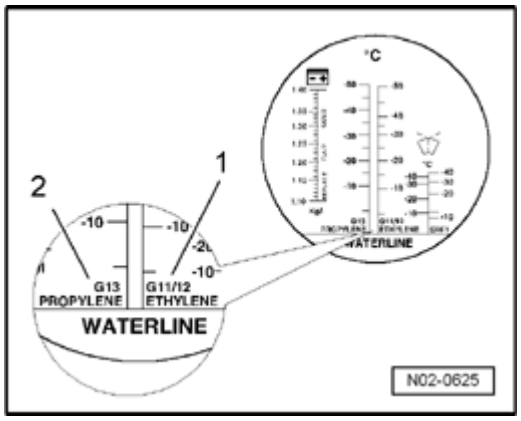
- Check concentration of coolant additive using refractometer T10007 (follow user manual).

scale **- 1 -** of refractometer is designed for coolant additives -G 12- according to TL "VW 774 D" and -G 11- according to TL "VW 774 C" .

scale **- 2 -** is designed for coolant additive -G 13-.

***Note**:*

- *Coolant additive G 13 is currently used only in vehicles of type "L 80" .*
- *Freeze protection additives protect against frost to about -25 C (about -35 C in arctic climates).*
- *If for climatic reasons greater freeze protection protection is required, amount of G 12 can be increased, but only up to 60% (freeze protection protection to about -40 ° C), otherwise freeze protection protection and cooling effectiveness will be reduced.*



- If freeze protection protection is insufficient, drain off required quantity shown in freeze protection protection table (⇒ 01-5, Freeze protection protection table) and add coolant additive G 11 or G 12.

***Note**:*

- *Observe disposal regulations!*

Freeze protection protection table

- Check coolant additive concentration after test drive again.

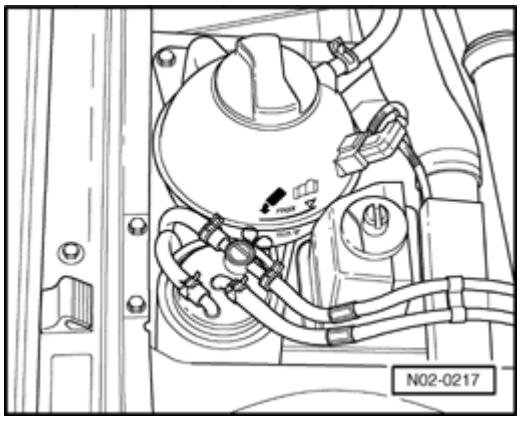
Freeze protection protection to ° C (F)		Quantity difference in Liters	
Actual value	Specified value	4-cyl. engine	6-cyl. engine

0 (32)	-25 (-13)	3.5	5.0
	-35 (-31)	4.0	6.0
-5 (23)	-25 (-13)	3.0	4.5
	-35 (-31)	3.5	5.5
-10 (14)	-25 (-13)	2.0	3.5
	-35 (-31)	3.0	4.5
-15 (5)	-25 (-13)	1.5	2.5
	-35 (-31)	2.0	3.5
-20 (-4)	-25 (-13)	1.0	1.5
	-35 (-31)	1.5	2.5
-25 (-13)	-35 (-31)	1.0	1.5
-30 (-22)	35 (-31)	0.5	1.0
-35 (-31)	-40 (-40)	0.5	0.5

Checking coolant level and adding coolant if necessary

- Check coolant level in expansion tank with engine cold.

- Delivery inspection: Coolant level at max. marking.
- Inspection service: Coolant level between min. and max. marking.



- If coolant is too low, add required amount according to mixture ratio.

***Note**:*

- *If fluid losses are greater than can be reasonably expected, determine cause and repair (repair measure)*

Mixture ratio:

Freeze protection protection to	Coolant additive	Water

-25 C (-13 F)	approx. 40 %	approx. 60 %
-35 C (-31 F)	approx. 50 %	approx. 50 %
-40 C (-40 F)	approx. 60 %	approx. 40 %

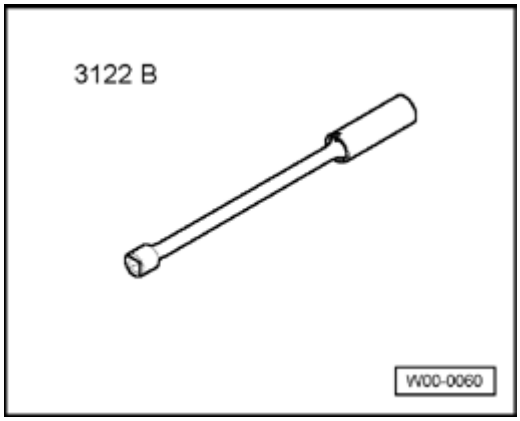
***Note**:*

- *Coolant additives G 11 or G 12 prevent frost and corrosion damage, scaling and also raises boiling point of coolant. Therefore, cooling system must be filled year round with frost and corrosion protection additives.*
- *A higher boiling point improves engine reliability under heavy load particularly in countries with tropical climates.*

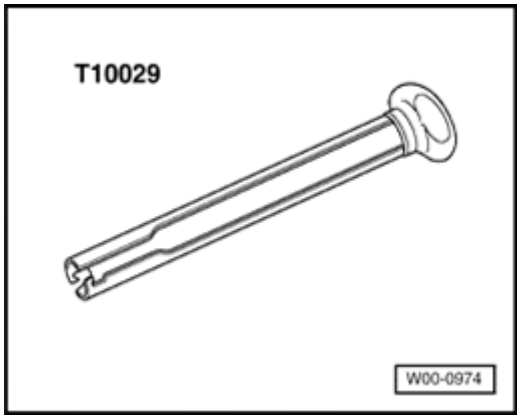
Spark plugs, replacing

Spark plug identification and replacement intervals ⇒ *Emissions Test*

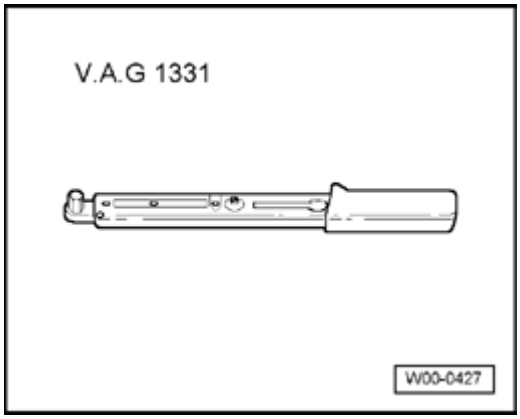
Required special tools and equipment



- Spark plug removal tool VAS 3122B



- Assembly tool T10029



- Torque wrench V.A.G 1331/ (5 - 50 Nm)
- Emissions Test binder

Perform following work procedure:

- Disconnect spark plug connectors using assembly tool T10029 .

- Remove spark plugs using spark plug removal tool VAS 3122B .

***Note**:*

- *Spark plug identification and tightening torque ⇒ Emissions Test*
- *Observe disposal regulations!*

- Install new spark plugs using spark plug removal tool VAS 3122B .

- Connect spark plug connectors using assembly tool T10029 .

- Check ignition wires and spark plug connectors for secure seating.

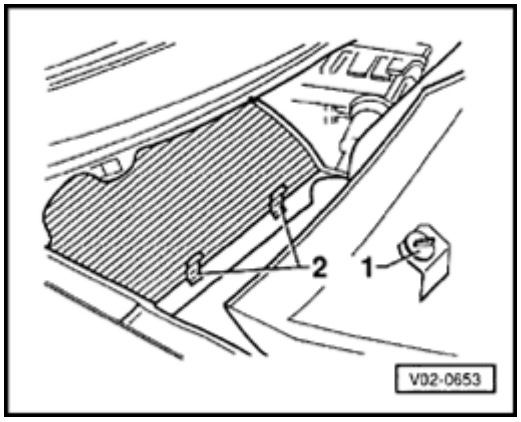
Dust and pollen filter element, replacing

Filter is located below plenum chamber on right.

Perform following work procedure:

Removing

- Turn buttons **- 1 -** for mounting of cover around 45 ° and remove cover from partition to engine compartment.



- Unlock spring latches **- 2 -** of filter element, remove filters upward.

***Note**:*

- *Observe disposal regulations!*

Installing

- Install new filter element.

- Install rubber seal and cover.

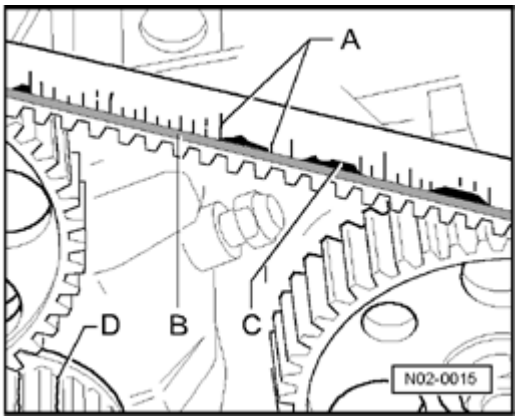
Toothed belt for camshaft drive: (Diesel engine code AAZ), Ccheck condition and tension

- Performing work procedure ⇒ *4-cyl. Diesel Engine, Mechanical; Repair Group 13; Crankcase, disassembling and assembling, toothed belt, removing and installing, tensioning*

Toothed belt and toothed belt tensioning roller (Diesel engine codes AFN and 1Z), replacing

- Performing work procedure ⇒ *4-cyl. Diesel Engine, Mechanical; Repair Group 13; Crankcase, disassembling and assembling, toothed belt, removing and installing, tensioning*

Toothed belt for camshaft drive (gasoline engine), check condition and tension



Condition of toothed belt must be checked for:

- Cracks or tears **- A -** , cross sectional breaks
- Lateral scouring **- B -**
- Fraying and/or outbreaks **- C -**
- Tears in tooth base **- D -**
- Layer separation (toothed belt carcass, cord strands)
- Traces of oil and grease

***Note**:*

- *It is essential to replace toothed belt if malfunctions are found. This will avoid possible break-downs or operating problems. replacement of a toothed belt is a repair measure.*

Check tension of toothed belt, and tension toothed belt if necessary

Work descriptions can be found in corresponding

⇒ *Repair Manual, Engine Mechanical, Repair Group 15, Cylinder Head, Valvetrain*

Toothed belt, check wear (TDI engines)

Required special tools and equipment

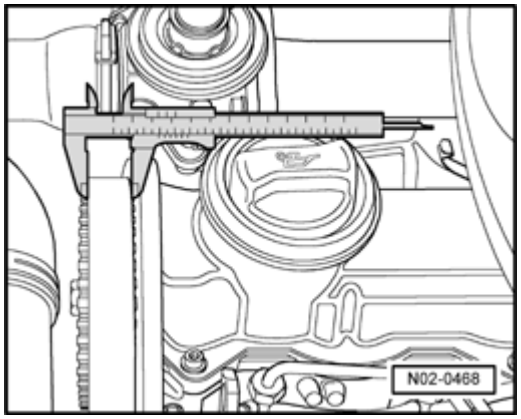
- Caliper (commercially available)

Perform following work procedure:

- Open clips of upper toothed belt protection.

- Pull upper toothed belt protection forward or remove it if necessary.

- Measure width of toothed belt using a caliper.



- Wear limit: 22 mm

***Note**:*

- *With a toothed belt width of 22 mm toothed belt has reached its wear limit and must be replaced (repair measure). Inform customer!*

Fuel filter, replacing (diesel engine)

***Note**:*

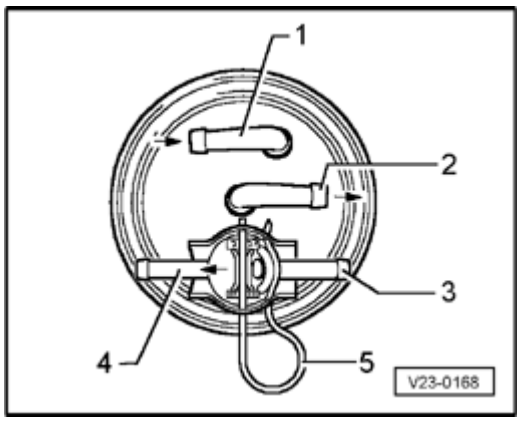
- *Make sure that diesel does not come in contact with coolant hoses. Clean hoses immediately if necessary!*
- *Observe disposal regulations!*

Perform following work procedure:

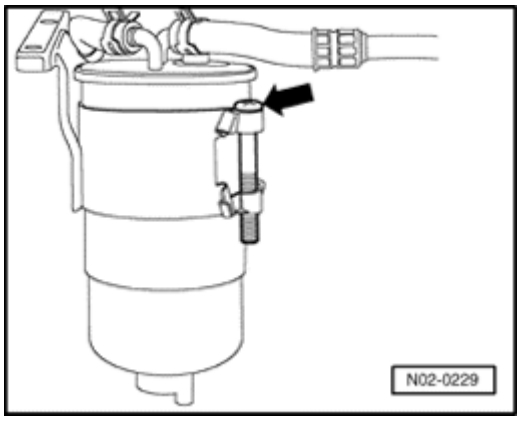
Removing

- Remove retaining clamp **- 5 -** .

- Remove regulating valve with attached fuel lines.



- Disconnect fuel hoses from hose connections **- 1 -** and **- 2 -** .



- Loosen bolt **- arrow -** at filter mounting pull out filter upward.

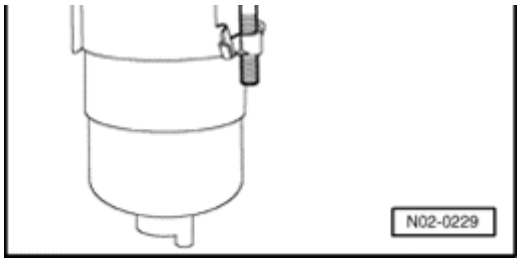
Installing

- Install new O-ring for sealing of regulating valve.

***Note**:*

- *flow direction of fuel is marked at connections by arrows (please do not exchange connections).*

- Fill new filter with clean diesel fuel. Thus engine can be started faster.



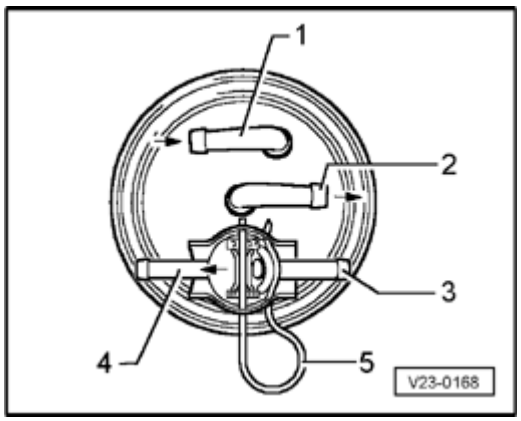
- Slide filter downward through filter mounting and fasten it at bolt **- arrow -** .

- Install regulating valve with attached fuel lines.

- Install retaining clamp **- 5 -** .

- Slide fuel hoses across hose connections **- 1 -** and **- 2 -** , and secure hoses using hose clamps.

- Check fuel system for proper seal (visual check).



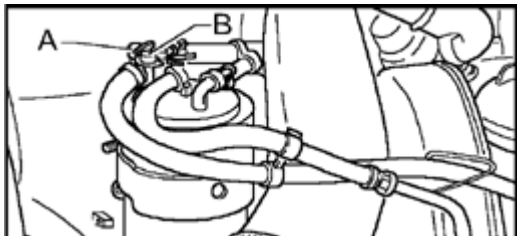
- Accelerate several times, afterwards fuel must flow without bubbles through transparent hose at idle.

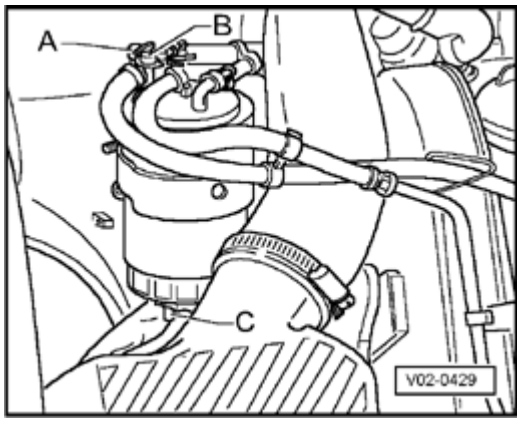
Fuel filter, draining water (Diesel engine)

***Note**:*

- *Make sure that diesel does not come in contact with coolant hoses. Clean hoses immediately if necessary!*
- *Observe disposal regulations!*

Perform following work procedure:





- Remove retaining clamp **- A -** and regulating valve **- B -** with fuel hoses attached.

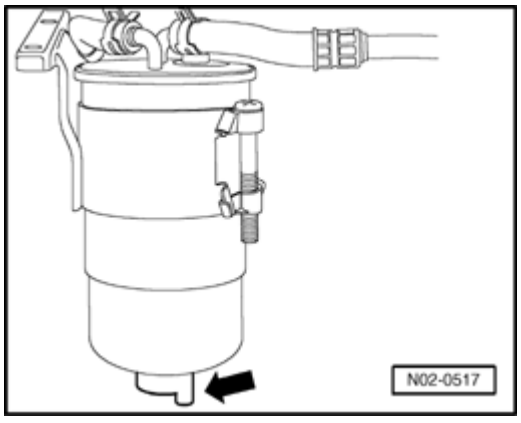
- Connect hose at connection sleeve of dewatering bolt **- arrow -** , remove bolt, and drain approx. 0.1L of fluid.

- Tighten dewatering bolt **- arrow -** and disconnect hose.

- Install new O-ring for sealing of regulating valve.

- Install regulating valve and attach retaining clamp.

- Check fuel system for proper seal (visual check).

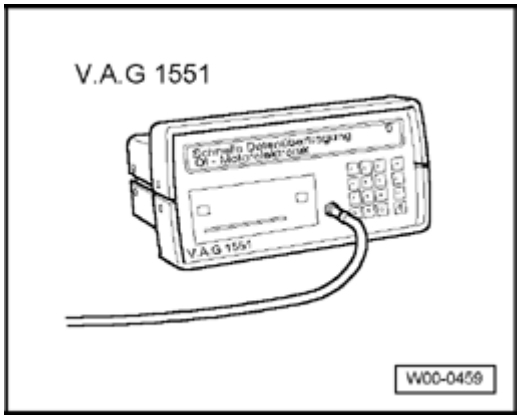


- Accelerate several times. Afterwards, fuel must flow without bubbles through transparent hose at idle.

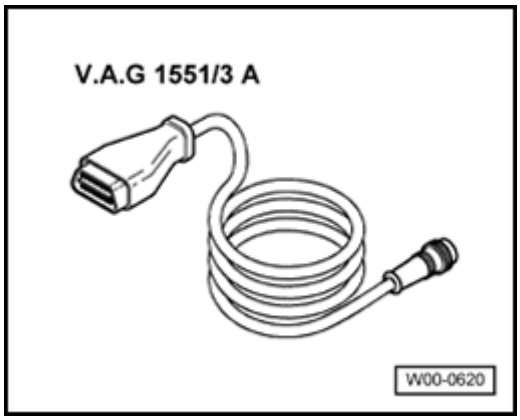
Automatic transmission, Checking ATF level

Vehicles 01.95 > with 01M transmissions

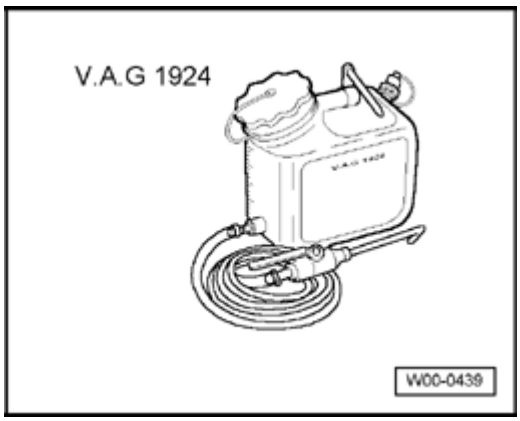
Required special tools and equipment



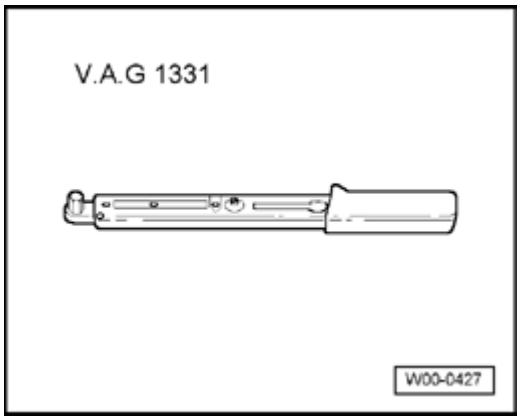
- VAG1551 Scan Tool (ST) V.A.G 1551/



- adapter cable V.A.G 1551/3 A



- ATF filler tool V.A.G 1924/



- Torque wrench V.A.G 1331/ (5 - 50 Nm)

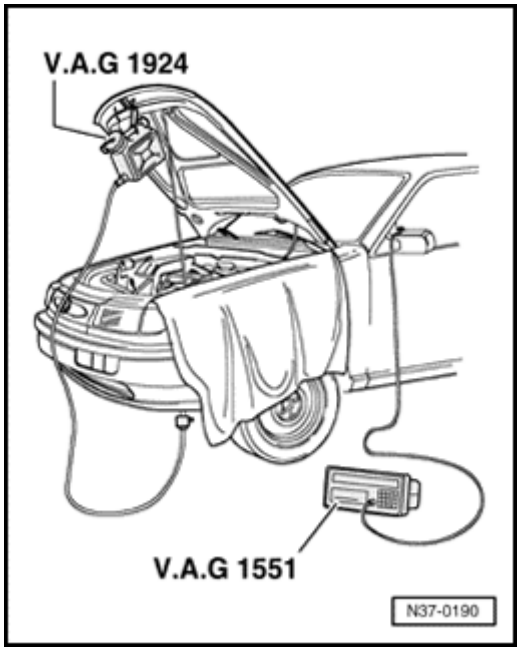
Test requirements

- Transmission not in emergency running mode, ATF temperature not above approx. 30 ° C
- Vehicle on level ground.
- Selector lever in "P"

Perform following work procedure:

- Secure container of ATF filler tool V.A.G 1924/ to vehicle.

Connect Scan Tool (ST) V.A.G 1551/ using adapter cable V.A.G 1551/3 A (⇒ 01-5, Connecting scan tool VAG 1551:).



At Scan Tool (ST) V.A.G 1551/ :

Indicated on display:

VAG - On Board Diagnostic (OBD) HELP
1- Rapid data transfer*

or

VAG - On Board Diagnostic (OBD) HELP
2- Blink code output*

* Two operating modes are displayed alternately

- Press button -1- to select "Rapid data transfer" operating mode.

Indicated on display:

Rapid data transfer HELP
Enter address word XX

- buttons 0 and 2 press. "02" is address word for "Transmission Electronics" .

Indicated on display:

Rapid data transfer Q
02 Transmission Electronics

- Press Q button to confirm input.

Indicated on display:

01M927733BB AG4 Transmission 01M 2029
Coding 00000 WSC 00000

control module identification, coding, and Workshop Code (WSC) of Scan Tool (ST) V.A.G 1551/ are indicated:

If displayed:

Control module not responding! HELP

- Press HELP button to print out an overview of all of possible malfunction causes.

- Enter address word 02 for Transmission Electronics again after repairing malfunction and press Q button to confirm.

Indicated on display:

01M927733BB AG4 Transmission 01M 2029
Coding 00000 WSC 00000

- → Press button.

- Raise vehicle.

- Place appropriate receptacle underneath transmission.

Indicated on display:

Rapid data transfer HELP
Select function XX

- Buttons 0 and 8 press. (Press 08 to select "Read measuring value block" function.)

Indicated on display:

Rapid data transfer Q
08 - Read measuring value block

- Press Q button to confirm input.

Indicated on display:

Read measuring value block
Enter display group number XXX

- Press buttons -0-, -0- and -5-. (Press 005 to select "Display group number 005" .)

Indicated on display:

Read measuring value block Q
Enter display group number 005

- Press Q button to confirm input.

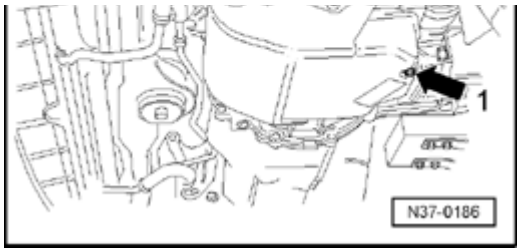
Indicated on display:

Read measuring value block 5 ->
30 ° C 0011011 0 900 RPM

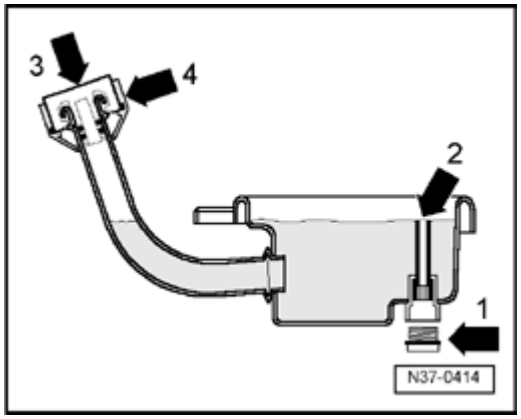
First display field displays ATF temperature.

- Bring ATF to test temperature.

Test temperature: 35 ° C to 45 ° C



- For ATF test remove locking bolt **- arrow -** in oil pan.

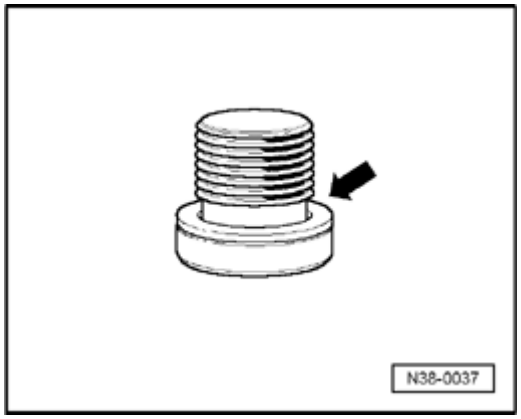


ATF present in overflow tube **- arrow 2 -** runs off.

If ATF drips from hole:

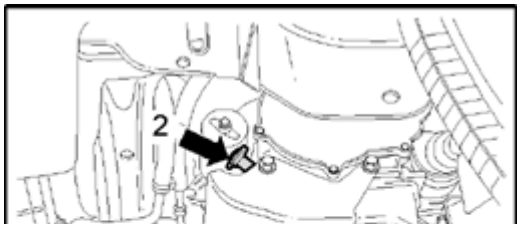
ATF must not be topped off.

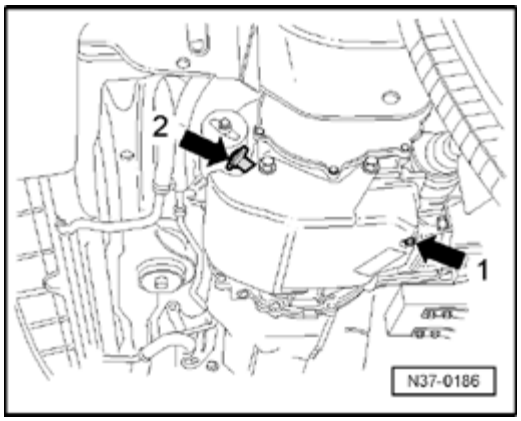
- Cut seal **- arrow -** of locking bolt with a side cutter and remove seal.



- Install locking bolt with new seal and screw in hand-tight.

- Tighten locking bolt **- arrow 1 -** with new seal to 15 Nm

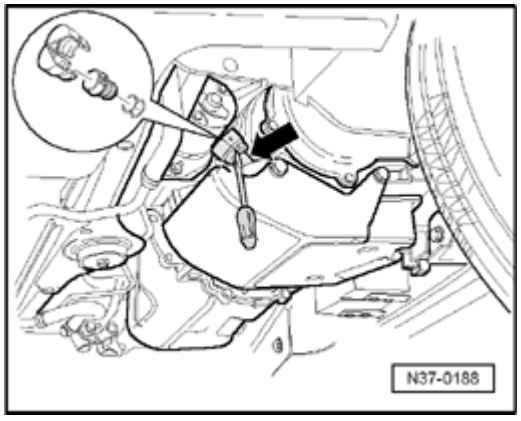




- End Output ⇒ 01-5, End Output .

If ATF in overflow tube runs out of hole:

Top off ATF



- Pry off cap **- arrow -** with a screwdriver for protection of sealing plug. While doing so, locking mechanism of cap will be destroyed, therefore always replace cap.

***Note**:*

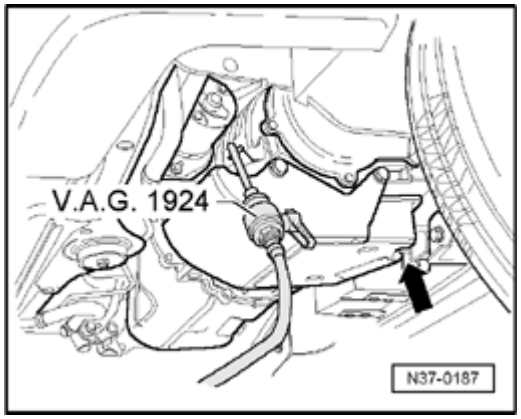
- *With some transmissions a cap with a clip bolting device is installed. This cap can be reused.*

- Remove sealing plug from filler tube.

- Add ATF using ATF filler tool V.A.G 1924/ until ATF exits from check hole **- arrow -** .

Fill up only following VW ATF:

Container size 0.5 L -part number G 052 162 A1

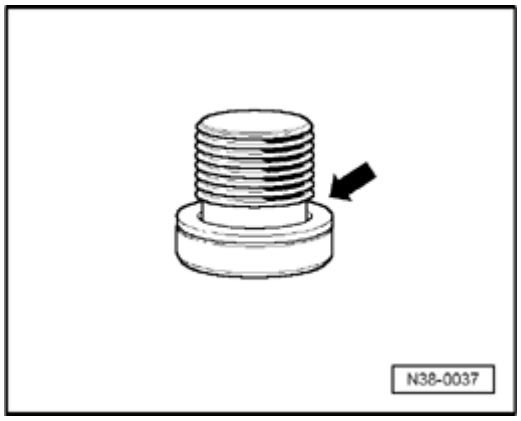


Container size 1.0 L -part number G 052 162 A2

***Note**:*

- *Adding to little or too much ATF impairs functioning of transmission.*

- Cut seal **- arrow -** of locking bolt with a side cutter and remove seal.

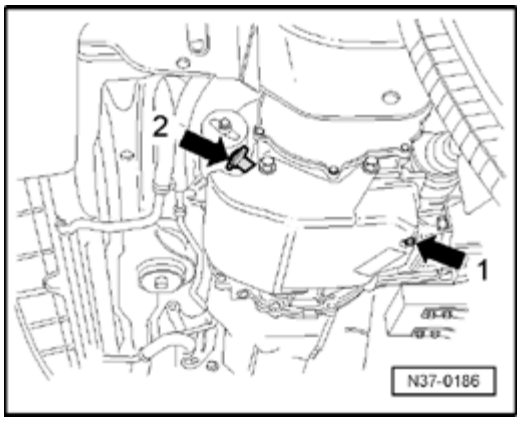


- Install locking bolt with new seal and screw in hand-tight.

- Tighten locking bolt **- arrow 1 -** with new seal to 15 Nm.

- Plug sealing plugs onto filler tube until locking straps engage, or

- Plug sealing plugs onto filler tube and secure with a new cap **- arrow 2 -** .



- Lock cap.

***Note**:*

- *Cap without clip bolting device must always be replaced. cap secures sealing plug.*
- *With some transmissions a cap with a clip bolting device is installed. This cap can be reused.*

End Output

Indicated on display:

Read measuring value block 5 ->
40 ° C 0011011 0 900 RPM

- → Press button.

Indicated on display:

Rapid data transfer HELP
Select function XX

- Buttons 0 and 6 press. (Press 06 to select "End Output" function.

Indicated on display:

Rapid data transfer Q
06 End Output

- Press Q button to confirm input.

Indicated on display:

Rapid data transfer Help
Enter address word XX

Automatic transmission, changing ATF

Vehicles ➢ 12.94 with 096 transmissions

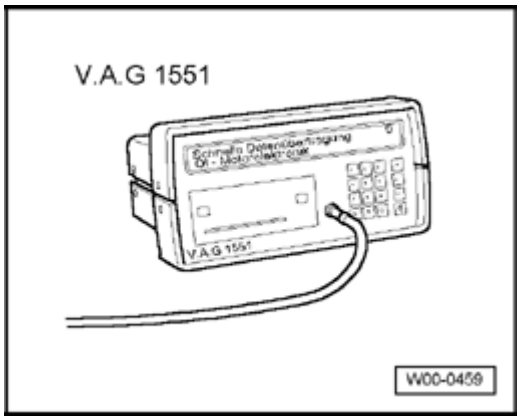
Use following VW ATF (yellowish color):

- Container size 0.5 L -part number G 052 162 A1
- Container size 1.0 L -part number G 052 162 A2

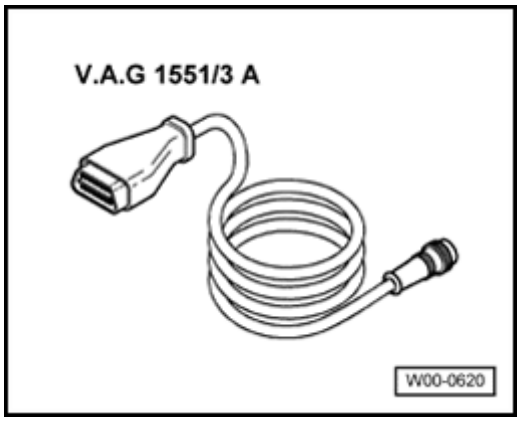
***Note**:*

- *Current supplies of ATF Dextron ll can be used up in transmissions until December 1994.*

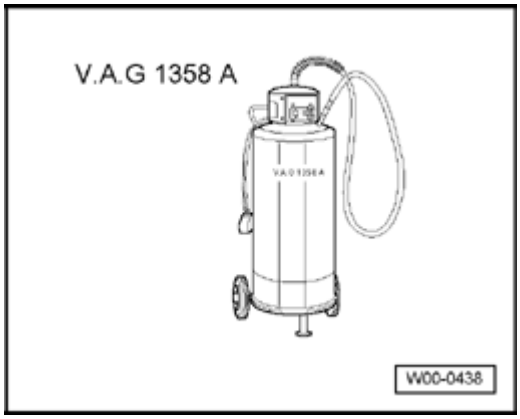
Required special tools and equipment



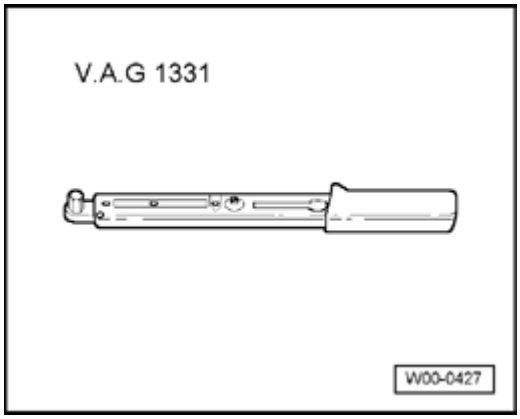
- VAG1551 Scan Tool (ST) V.A.G 1551/



- adapter cable V.A.G 1551/3 A



- V.A.G1358A and sensor V.A.G 1358/ A2



- Torque wrench V.A.G 1331/ (5 - 50 Nm)

Perform following work procedure:

- Extract ATF using probe V.A.G 1358/ A2 and V.A.G1358 .

***Note**:*

- *Observe disposal regulations!*
- *Engine must not be started without ATF and vehicle must not be towed!*

- Remove oil pan with ATF-strainer.

- Remove spacers from old oil pan seal.

- Clean oil pan.

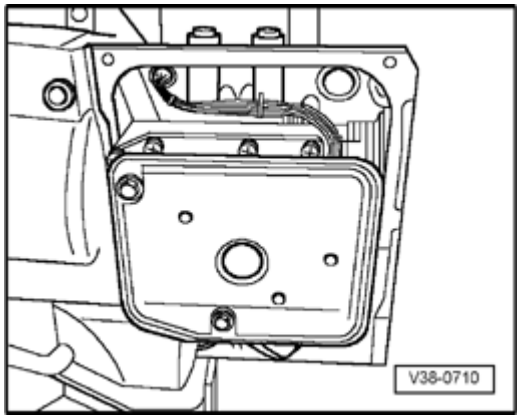
Pay attention to cleanliness during following installation!

- Snap new seal into new ATF-strainer.

- Snap removed spacers into new oil pan seal.

- Install new ATF-strainer with new seal. Tightening torque for securing bolts: 8 Nm.

- Install oil pan with new seal. Make sure that spacers are fastened. Tightening torque for securing bolts: 12 Nm.



- Next, add 3.0L ATF (replacement capacity) using a funnel.

***Note**:*

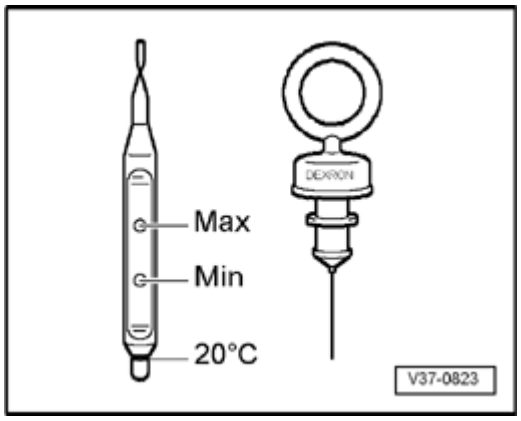
- *To wipe dipstick off a lint-free cloth must be used!*
- *Adding to little or too much ATF impairs functioning of transmission.*

- Shift once into all selector lever positions while standing and with engine running.

- Check ATF level using dipstick.

Test requirements:

- Vehicle on level ground
- Hand brake is engaged
- Selector lever in "P"
- Engine running at idle.



- ATF must be filled up in cold condition at least up to 20 ° C-marking, otherwise add ATF.

- Bring ATF to a temperature of 50 ... 70 ° C. temperature will be measured using Scan Tool (ST) V.A.G 1551/ as follows:

- Let engine run at idle.

Connect Scan Tool (ST) V.A.G 1551/ using adapter cable V.A.G 1551/3 A (⇒ 01-5, Connecting scan tool VAG 1551:).

At Scan Tool (ST) V.A.G 1551/ :

Indicated on display:

VAG - On Board Diagnostic (OBD) HELP

1- Rapid data transfer*

or

VAG - On Board Diagnostic (OBD) HELP

2- Blink code output*

* Two operating modes are displayed alternately

- Press button -1- to select "Rapid data transfer" operating mode.

Indicated on display:

Rapid data transfer HELP

Enter address word XX

- Press buttons 0 and 2 for address word "Transmission electronics" and confirm input with Q button.

Indicated on display:

Rapid data transfer Q
02 Transmission Electronics

- Press Q button to confirm input.

Indicated on display:

096927733BA AG3 transmission 096 2754
Coding 00000 WSC 00000

control module identification, coding, and Workshop Code (WSC) of Scan Tool (ST) V.A.G 1551/ are indicated:

If displayed:

Control module not responding! HELP

- Press HELP button to print out an overview of all of possible malfunction causes.

- Enter address word 02 for Transmission Electronics again after repairing malfunction and press Q button to confirm.

Indicated on display:

096927733BA AG3 transmission 096 2754
Coding 00000 WSC 00000

- Press → -button.

Indicated on display:

Rapid data transfer HELP
Select function XX

- Press buttons 0 and 8 for function "Read measuring value block" and confirm input with Q button.

Indicated on display:

Rapid data transfer Q
08 - Read measuring value block

- Press Q button to confirm input.

Indicated on display:

Read measuring value block
Enter display group number XXX

- Press buttons -0-, -0- and -5-. (Press 005 to select "Display group number 005" .)

Indicated on display:

Read measuring value block Q
Enter display group number 005

- Press Q button to confirm input.

ATF temperature in ° C appears in display field 1 (exact measuring value only starting from 50 ° C).

Read measuring value block 1
1 2 3 4

- Check ATF level at a temperature of 50 ... 70 ° C using dipstick. ATF level must be between min. and max. marking of dipstick.

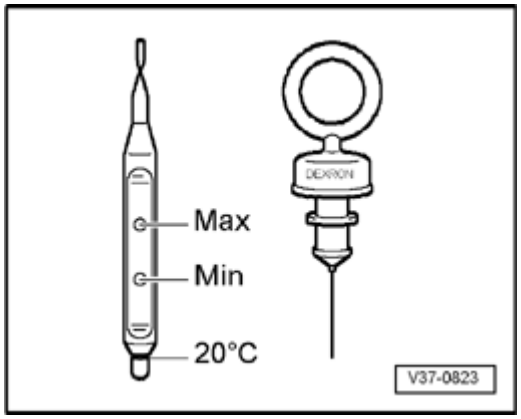
- If ATF level is too low, add ATF using a funnel.

- If ATF level is too high, extract ATF using probe V.A.G 1358/ A2 and V.A.G1358 .

- Shift once into all selector lever positions while standing and with engine running.

- Check ATF level again (at 50 ... 70 ° C)

At Scan Tool (ST) V.A.G 1551/ :



- → Press button.

Indicated on display:

Rapid data transfer HELP
Select function XX

- Press buttons 0 and 6 for function "End data transfer" and confirm input with Q button.

- Switch off ignition and disconnect diagnostic connector.

Power steering fluid level, checking

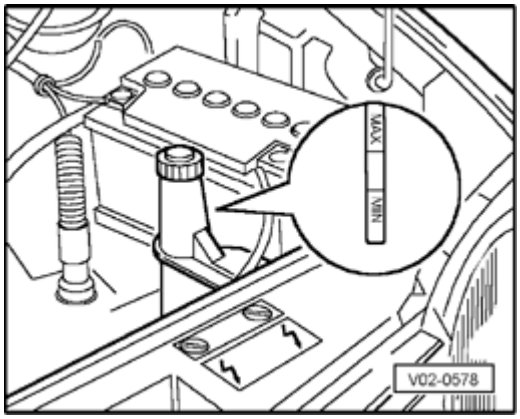
Fluid, when cold:

Perform following work procedure:

- With engine not running, bring front wheels into straight-ahead position.

- Unscrew reservoir cap **- arrow -** with dipstick.

- Clean off dipstick with a clean rag.



- Tighten cap by hand and remove again.

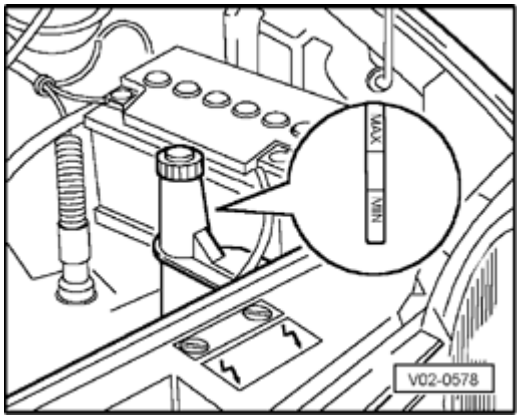
***Note**:*

- *Fluid level is only valid if cap has been screwed on.*

- Check oil level: Fluid level must be between "MIN" and "MAX" markings.

***Note**:*

- *If fluid level is above specified range, oil must be suctioned off.*
- *If oil level is below specified area, then hydraulic system must be checked for leaks (repair measure). It is not enough to simply top off with fluid.*
- *If hydraulic system is leak-free top-up with "G 002 000" oil.*



- Screw cap on hand tight.

Fluid, at operating temperature (from approx. 50 °):

Perform following work procedure:

- With engine not running, bring front wheels into straight-ahead position.

- Unscrew reservoir cap with fitted dipstick.

- Clean off dipstick with a clean rag.

- Tighten cap by hand and remove again.

***Note**:*

- *Fluid level is only valid if cap has been screwed on.*

- Check oil level: Fluid level must be between "MIN" and "MAX" markings.

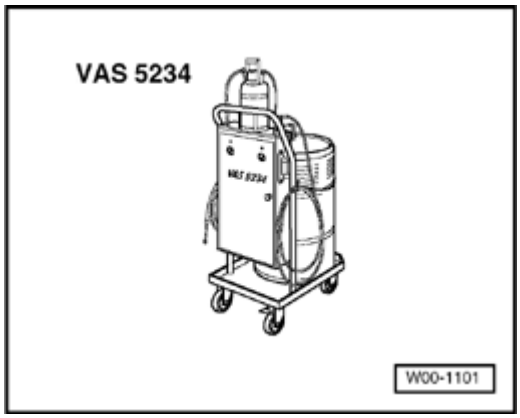
***Note**:*

- *If oil level is above MAX. marking, oil must be extracted.*
- *If oil level is below MIN. marking, then hydraulic system must be checked for leaks (repair measure). It is not enough to simply top off with fluid. If hydraulic system is leak-free top-up with "G 002 000" oil.*

- Screw cap on hand tight.

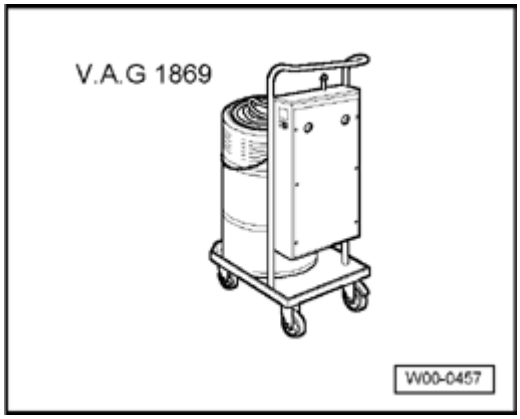
Brake fluid, changing

Required special tools and equipment



- Brake filling and bleeding tool VAS 5234

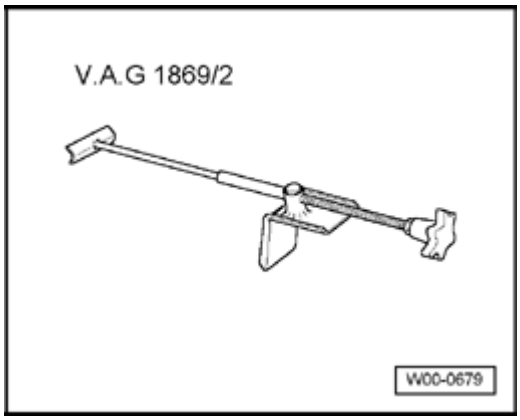
or



- brake filling and bleeding tool V.A.G 1869/

or

- Brake filling and bleeding tool V.A.G 1869/ with upgrade kit V.A.G 1869/4



- Brake pedal depressor V.A.G 1869/2

Vehicles with manual transmission:

- bleeder hose V.A.G 1238/B3 670 mm long

Use only new brake fluid with part number B 000 700 A.
(corresponds to US standard FMVSS 116 DOT 4)

Caution!

- ***NEVER bring brake fluid into contact with fluids containing mineral oil (oil, gasoline, cleaning fluids). Oils containing minerals damage seals and sleeves on brake systems.***
- ***Brake fluid is poisonous. Due to it's caustic nature, it must also never be brought into contact with paint.***
- ***Brake fluid is hygroscopic, meaning that it absorbs moisture from surrounding air, and must therefore always be stored in air-tight containers.***
- ***Rinse off any spilled brake fluid using plenty of water.***
- ***Observe disposal regulations!***

Perform following work procedure:

Follow user manual for brake filling and bleeding tool VAS 5234 or brake filling and bleeding tool V.A.G 1869/ !

- Unscrew brake fluid reservoir cap.

- Extract as much brake fluid as possible from brake fluid reservoir using intake hose of brake filling and bleeding tool VAS 5234 or brake filling and bleeding tool V.A.G 1869/ (with upgrade kit).

- With brake filling and bleeding tool V.A.G 1869/ (without upgrade kit) extract as much brake fluid as possible using a suction bottle with built-in strainer.

***Note**:*

- *Make sure that no brake fluid runs through strainer after completing extraction sequence (brake fluid level in reservoir must stop at lower edge of strainer).*

Caution!

Do not reuse, (used) extracted brake fluid.

- Install brake depressor V.A.G 1869/2 between driver's seat and brake pedal, and tension.

- Screw adapter VAS 5234/1 or adapter V.A.G 1869/1 onto brake fluid reservoir.

- Connect filler hose of brake filling and bleeding tool VAS 5234 or brake filling and bleeding tool V.A.G 1869/ to adapter.

Vehicles with manual transmission:

- Remove cover cap from bleeder screw of clutch slave cylinder.

- Connect bleeder hose of collector bottle on bleeder screw of clutch slave cylinder, open bleeder screw, and allow approx. 0.1 liters to flow out. Close bleeder screw and install cover cap onto it.

- Operate clutch pedal repeatedly.

Continuation for all vehicles:

- Remove cover caps from bleeder screws of wheel brake cylinders and brake calipers.

- Connect bleeder hose of collector bottle to rear bleeder screw) , open bleeder screw, and allow corresponding bake fluid quantity to flow out (see table on page ⇒ 01-5, Table - Sequence / quantity of brake fluid:). Close bleeder screw.

) For left-hand drive vehicles, bleed rear right first and for right-hand drive vehicles bleed rear left first.

Repeat work procedure on other side of vehicle at rear.

- Connect bleeder hose of collector bottle to front bleeder screw) , open bleeder screw, and allow corresponding quantity to flow out (see table below). Close bleeder screw.

Repeat work procedure on other side of vehicle at front.

Table - Sequence / quantity of brake fluid:

Order: brake calipers (Left Hand Drive -LHD- vehicles)	Brake fluid quantity which must flow out of brake calipers:
Right rear	0.4 to 0.5 liters
Left rear	0.4 to 0.5 liters
Right front	0.4 to 0.5 liters

Left front	0.4 to 0.5 liters
Total quantity [1)]	2 Liter

[1)] with siphoned brake fluid from brake fluid reservoir and replacement capacity of hydraulic clutch mechanism

- Install cover caps to brake caliper bleed screws.

- Move filler lever on VAS5234 or brake filling and bleeding tool V.A.G 1869/ to position **- B -** (see user manual).

- Remove filler hose from adapter.

- Unscrew adapter from brake fluid reservoir.

- Check brake fluid level and correct if necessary.

- Screw sealing cap onto brake fluid reservoir.

- Remove brake pedal depressor.

- Check pedal pressure and brake pedal free play. Free play: Max. $^{1}/_{3}$ of pedal travel

Brake fluid level, checking

Use only new brake fluid with part number B 000 700 A. (corresponds to US standard FMVSS 116 DOT 4)

Caution!

- ***NEVER bring brake fluid into contact with fluids containing mineral oil (oil, gasoline, cleaning fluids). Oils containing minerals damage seals and sleeves on brake systems.***
- ***Brake fluid is poisonous. Due to it's caustic nature, it must also never be brought into contact with paint.***
- ***Brake fluid is hygroscopic, meaning that it absorbs moisture from surrounding air, and must therefore always be stored in air-tight containers.***
- ***Rinse off any spilled brake fluid using plenty of water.***
- ***Observe disposal regulations!***

Note following:

***Note**:*

- *To make sure that brake fluid will not overflow reservoir, max. marking must not be exceeded.*

Inspection service:

- fluid level must always be judged in conjunction with brake pad wear. When vehicle is in use, fluid level tends to drop slightly due to brake pad wear and automatic adjustment.

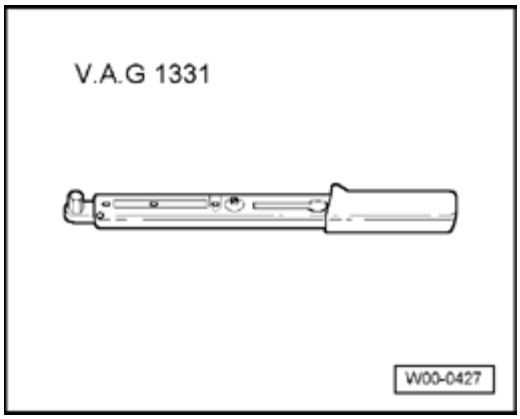
- When fluid level is at min. marking or just above, it is not necessary to top up if brake pad wear limit is almost reached.

- If pads are new or well above wear limit, then fluid level must be between min. and max. markings.

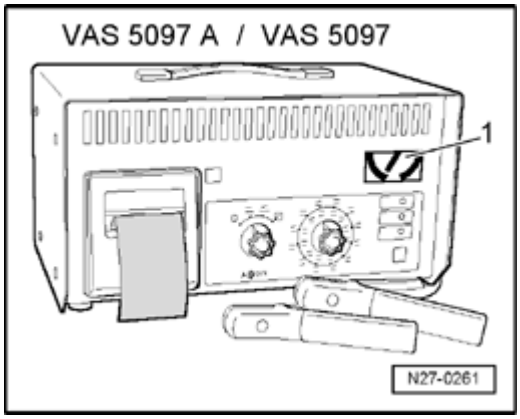
- If fluid level is below min. marking, brake system must be checked before brake fluid is added (repair measure).

Battery, checking

Required special tools and equipment



- Torque wrench V.A.G 1331/ (5 - 50 Nm)



- Battery tester with printer VAS 5097/

or

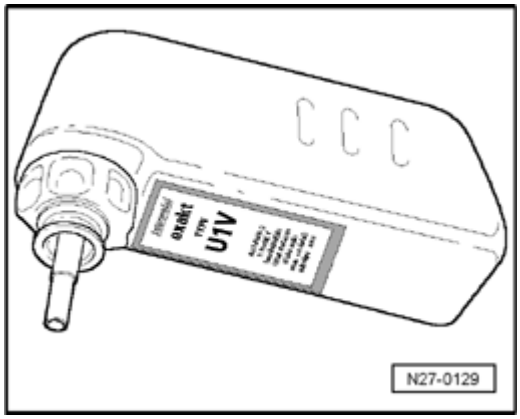
- Battery tester with printer VAS 5097/

or

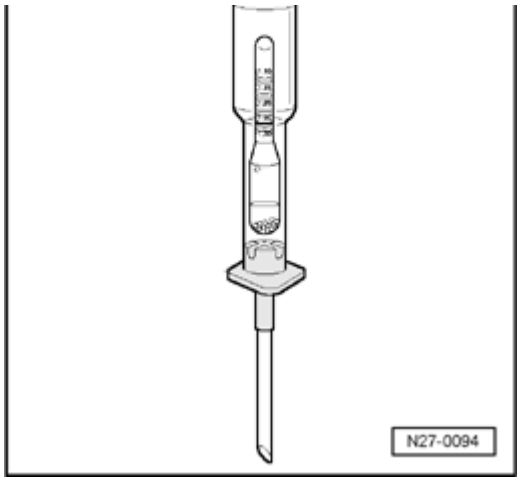
- battery tester VAS 5096/

or

- battery tester VAS 5033



- Battery fill bottle VAS 5045/



- Commercially available hydrometer

Inspection service (Batteries with "magic eye")

Perform a visual check ⇒ 01-5, Performing visual check (all batteries) and check battery condition via "magic eye" ⇒ 01-5, Checking batteries / batteries with magic eye and with top-sealed battery cell plugs .

Inspection service (Batteries without "magic eye")

Perform a visual check ⇒ 01-5, Performing visual check (all batteries) and check electrolyte level ⇒ 01-5, Checking acid level (batteries without magic eye) . If topping off with distilled water was required, also perform a battery load test ⇒ 01-5, Battery load check .

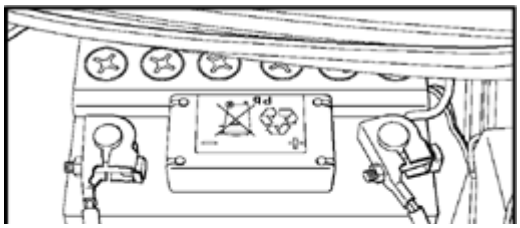
Performing visual check (all batteries)

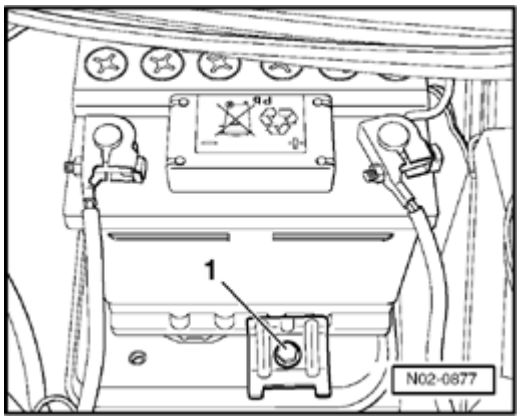
Perform following work procedure:

- Check battery housing for damage. Battery acid can leak out if housing is damaged.

- Check battery terminals (battery terminal connections) for damage. If battery terminals are damaged, contact with wiring connections cannot be guaranteed. This can cause a cable fire and interfere with function of electrical system.

- Check battery for secure seating, tighten securing bolt **- 1 -** on retaining bracket to 22 Nm if necessary.





If battery is not securely seated, following dangers exist:

- Shortened service life due to damage from vibration (danger of explosion).
- If battery is not secured properly normal shock and vibration can damage battery plates, which results in premature battery failure.
- battery casing can be damaged by fastening clip (this might possibly allow acid to escape from battery, which would have severe consequences).
- Poor crash safety.

Checking batteries / batteries with magic eye and with top-sealed battery cell plugs

Checking battery / batteries with magic eye and without battery cell plugs ⇒ 01-5, Checking battery / batteries with magic eye and without battery cell plugs

magic eye **- arrow -** gives information regarding acid level and charge level of battery.

- Before performing a visual check, lightly and carefully tap onto magic eye using a screwdriver handle.

Air bubbles, which can affect display, are dispersed by doing this.

Reading colored display of "magic eye" will therefore be more accurate.

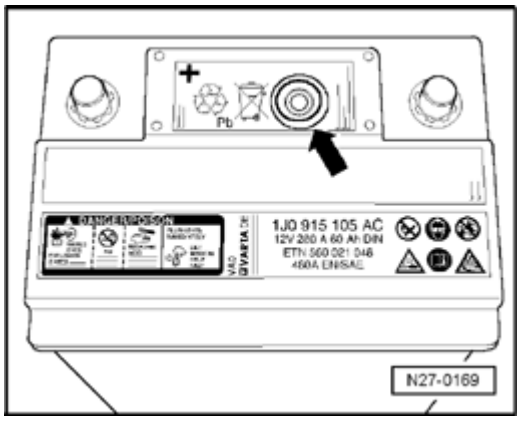
***Note**:*

- *magic eye can be located at various positions on battery.*

- *Three different color indications are possible:*

Green → battery is sufficiently charged.

Black → no charge or charge too low (repair measure).



Colorless or yellow → critical acid level reached, distilled water must be topped up ⇒ 01-5, Topping off distilled water (batteries with magic eye) . Then, perform a battery load test ⇒ 01-5, Battery load check .

***Note**:*

- *If battery is older than 5 years and magic eye is a light color or a yellow like color then replace battery after consulting customer.*

Battery load check

***Note**:*

- *Following description refers to Batterie tester with printer VAS 5097/ If battery load test is performed with another battery tester ⇒ user manual for respective battery tester.*

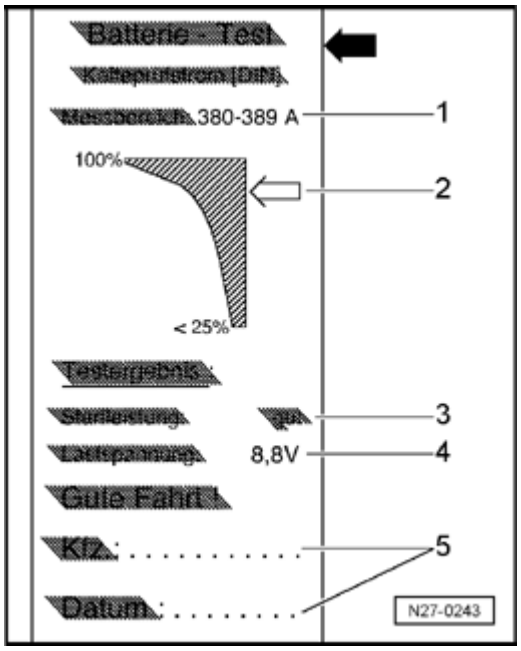
- *When using battery tester VAS 5097 A or Battery tester with printer VAS 5097/ it is not necessary to remove battery. You also do not have to disconnect battery.*

- Switch ignition off.

- Connect tester cable clamps to battery terminal. ⇒ *User manual for battery tester*

clips must make good contact with battery terminals.

- load current varies depending on battery capacity, and has to be adjusted on tester. ⇒ *User manual for battery tester*



- Perform battery load test according to user manual for battery tester and compare test printout **- arrow -** with following table.

Remarks concerning test printout:

1 - Measuring range set on tester

2 - Diagram (arrow indicates battery state)

3 - Test result

4 - Battery voltage while load test is running

5 - Vehicle data and date (to be completed by person performing test)

After recharging battery, perform a battery load test again.

[1)] If after charging, display shows "starting output sufficient, starting output poor, starting output very poor or Not testable" , replace battery after consulting customer.

Explanation for battery load test:

Because of high load on battery during this test (a high current flows) battery voltage lowers.

If battery is in good condition, voltage drops only to minimum voltage.

If battery is faulty or only faintly charged, battery voltage will

drop rapidly to below displayed minimum voltage.

After test has been performed, voltage will remain at this low value for a long time, and will climb back up only very slowly.

Printout from battery tester	Inspection service
Starting output very good	Battery OK
Starting output good	Battery OK
Starting output sufficient	Recharge battery 1)
Starting output poor	Recharge battery 1)
Starting output very poor	Recharge battery 1)
Not testable	Recharge battery 1)

Topping off distilled water (batteries with magic eye)

To avoid electrolyte impurities, which can increase self-discharge of battery, only distilled water may be added to increase acid level.

Perform following work procedure:

- Remove foil over sealing plug.

- Unscrew battery sealing plugs.

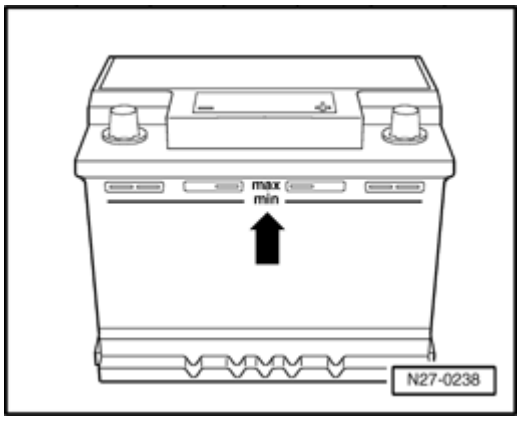
- Using battery fill bottle VAS 5045/ fill with distilled water up to max.-marking.

***Note**:*

- *Construction of filler tube of battery filler bottle VAS 5045/ prevents overfilling of battery cells and escaping of battery acid. When max. fill level is reached, inflow of distilled water into cells is interrupted.*

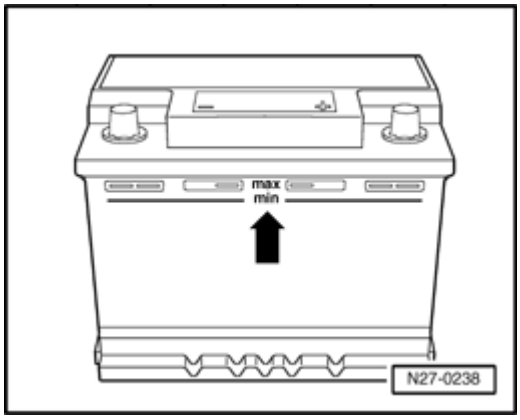
- *Too low an electrolyte level (below min.-marking) causes a loss of battery capacity (power), due to cell plates drying out. If cell-plates are not surrounded with electrolyte (sulfuric acid), plates, plate straps, and cell connectors will corrode. battery will not function as a consequence of this corrosion. battery becomes unusable.*

- *If electrolyte level is too high (above max.-marking), electrolyte (a mixture of sulfuric acid and water) escapes and causes damage outside battery, for example to functional parts in engine compartment.*



- Screw in battery sealing plugs.

Checking acid level (batteries without magic eye)



Markings on battery housing **- arrow -**

***Note**:*

- *Maintaining correct electrolyte level in battery is an important factor affecting length of battery's service life.*

Electrolyte level too low

***Note**:*

- *Too low an electrolyte level (below min.-marking) causes a loss of battery capacity (power), due to cell plates drying out. If cell-plates are not surrounded with electrolyte (sulfuric acid), plates, plate straps, and cell connectors will corrode. battery will not function as a consequence of this corrosion. battery becomes unusable.*

To avoid electrolyte impurities, which can increase self-discharge of battery, only distilled water may be added to increase acid level.

- Unscrew battery sealing plugs.

- Using battery fill bottle VAS 5045/ fill with distilled water up to max.-marking.

***Note**:*

- *Construction of filler tube of battery filler bottle VAS 5045/ prevents overfilling of battery cells and escaping of battery acid. When max. fill level is reached, inflow of distilled water into cells is interrupted.*

- Screw in battery sealing plugs.

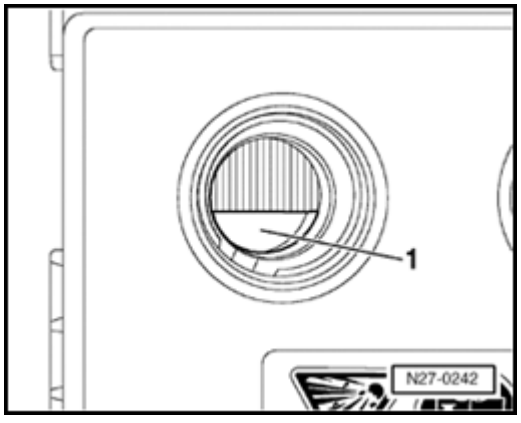
Electrolyte level too high

***Note**:*

- *If electrolyte level is too high (above max.-marking), electrolyte (a mixture of sulfuric acid and water) escapes and causes damage outside battery, for example to functional parts in engine compartment.*

- Unscrew battery sealing plugs.

At an acid level that is too high (overfilling), i.e. it lies above inner acid level marking (plastic plug) or above exterior max.-marking:



- Use hydrometer to extract off electrolyte until its level has reached mark on plastic peg **- 1 -** or max. mark.

***Note**:*

- *Observe disposal regulations!*

- Screw in battery sealing plugs.

Checking battery / batteries with magic eye and without battery cell plugs

These batteries can be recognized by "magic eye" **- 1 -** and a cover **- 2 -** (as shown in illustration).

***Note**:*

- *"magic eye" can be located at various positions on battery.*

Caution!

Cover is used only for filling during production. Cover must not be removed under any circumstances, otherwise battery may be damaged. battery becomes unusable.

magic eye gives information regarding acid level and charge level of battery.

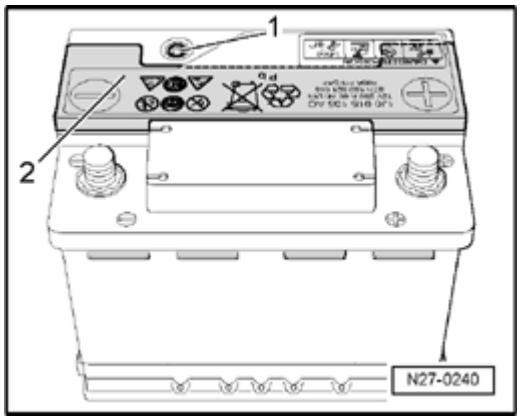
- Before performing a visual check, lightly and carefully tap onto magic eye using a screwdriver handle.

Air bubbles, which can affect display, are dispersed by doing this.

Reading colored display of "magic eye" will therefore be more accurate. Three different color indications are possible:

- Green → battery is sufficiently charged.

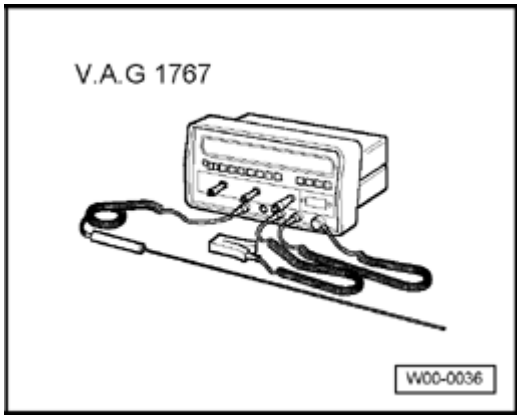
- Black → no charge or charge too low, battery must be charged (repair measure).



- Colorless or yellow → battery must be replaced.

Idle speed (Diesel engine code AAZ): Checking

Required special tools and equipment



- Ignition tester V.A.G 1767/

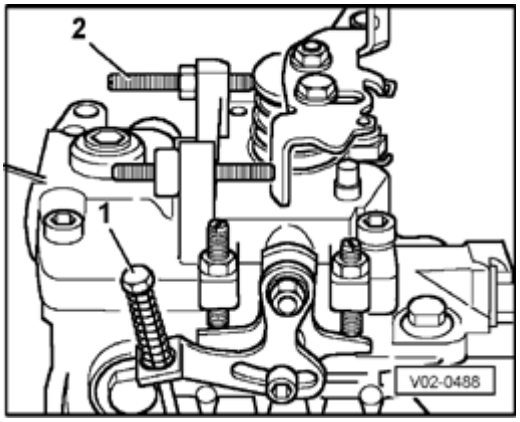
or

- Ignition tester V.A.G 1367

Test- and adjustment requirements and specified values ⇒ *Emissions test*

Perform following work procedure:

- Ignition tester V.A.G 1367 or Ignition tester V.A.G 1767/



- Check idle speed and adjust as necessary by turning idle speed adjusting screw **- 1 -** .

Headlight setting, checking

Required special tools and equipment

- headlight adjuster VAS 5046/

or

- headlight adjuster VAS 5047/

or

- headlight adjuster VAS 5208

or

- headlight adjuster VAS 5209

Following test- and adjustment instructions are applicable to all countries. But national legislation and regulations of respective country is to be adhered to.

Test- and adjustment requirements:

- Tire pressure OK.
- Lenses must not be damaged or dirty.
- Reflectors and bulbs OK.
- Vehicle load must be established.

Load: With one person or 165 lbs (75 kg) on driver's seat with otherwise unloaded vehicle (curb weight).

Curb weight is weight of vehicle ready for operation with completely filled fuel tank (at least 90 %), including weight of all equipment items carried for operation (e.g. spare wheel, tool, vehicle jack, fire extinguisher etc.).

If fuel tank is not filled to at least 90 %, establish load as follows:

- Check fill level of fuel tank via fuel gauge. Determine additional weight according to following table and place weight in luggage compartment.

Table of filling quantity:

Fill level of	Additional weight

fuel gauge	in lbs (kg)
1/4	100 (45)
1/2	66 (30)
3/4	33 (15)
Full	0 (0)

Example:

If tank is filled half way, an additional weight of 66 lbs (30 kg) must be placed into luggage compartment.

***Note**:*

- *As additional weight it is recommended to use fuel canisters filled with water (a 5-liter fuel canister weighs approximately 11 lbs (5 kg)).*

Vehicle must be rolled for several meters or front and rear suspension must be bounced several times so that springs settle.

- Vehicle and headlight adjuster must be on a level surface. ⇒ *User manual for headlight adjuster.*
- Vehicle and headlight adjuster must be aligned.
- Inclination measure must be set.

Inclination measure:

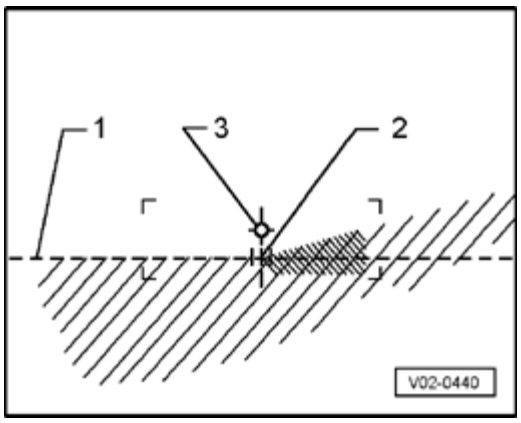
Inclination measure in "%" is embossed at top of headlight housing. Main headlights must be adjusted according to this measure. percentage information on sticker is based on a projection distance of 10 meters. For example: inclination of 1.2 % converts to approx. 12 cm.

Inclination measure for fog lights: 20 cm

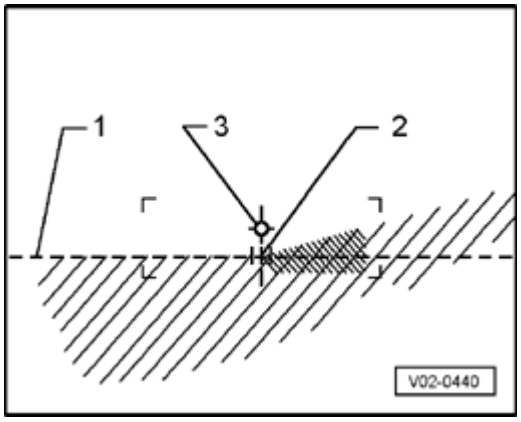
- Thumbwheel for headlight range control must be in base position (-).

Checking headlight setting (with new test screen without 15 ° -setting line)

Headlights:



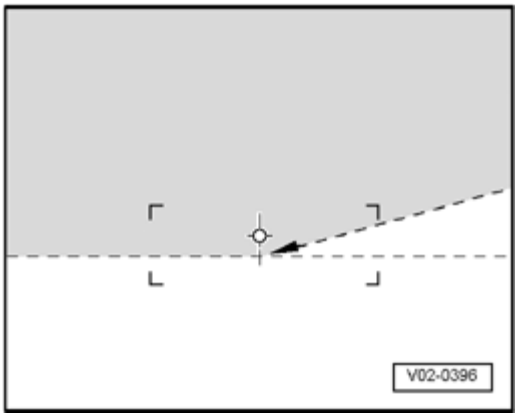
- With low beam switched on, check whether horizontal light-dark border contacts hyphenated line **- 1 -** of test surface.



- Check whether break-away point **- 2 -** between left horizontal part and rising part on right of light-dark border runs vertically through central point **- 3 -** . Bright core of light beam must be on right of vertical line.

***Note**:*

- *To make it easier to find break-away point **- 2 -** cover and uncover left half of headlight (as viewed when looking forward) a few times. Next, check low beam again.*
- *After correct adjustment of low beams center point of light beam of high beams must lie on central mark **- 3 -** .*

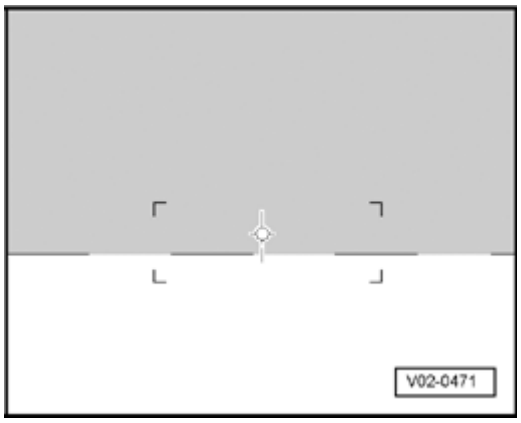


- *For previous test screen with 15 ° -setting line, adjust as for new test screen. To avoid incorrect settings ignore 15 ° -setting line.*

Fog lights:

- Check whether upper light-dark border touches setting line and runs across complete test screen width horizontally.

Other auxiliary headlights:



Later inserted auxiliary headlights of other systems must be checked and adjusted according to guidelines valid for them.

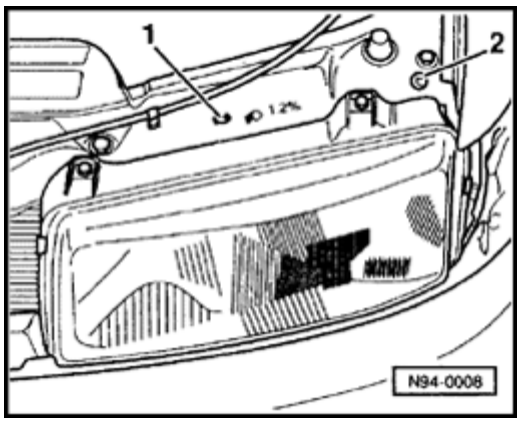
Headlights, adjusting

Headlight (left)

1 - Height adjustment

2 - Horizontal adjustment

- Perform adjustment using appropriate screwdriver (do not damage adjustment wheel).



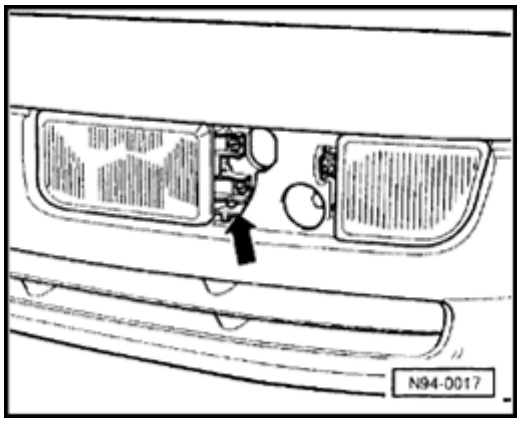
Both adjustment wheels on right headlight are allocated symmetrically.

***Note**:*

- *Also check whether reflectors in both headlights adjust themselves uniformly when operating headlight range control.*

Fog light (left)

- Turn adjusting screw toward left (arrow) to lower beam height. Horizontal adjustment is not possible.



Adjusting screw on right headlight is allocated symmetrically.

Road test, performing

To what extent following can be checked is dependent upon vehicle equipment and local conditions (urban/country).

Following should be checked by means of a road test:

- Engine: Output, misfiring, idling speed, acceleration

- Clutch: Pulling away, pedal pressure, odors

- Gear selection: Ease of operation, shift lever position

- Automatic transmission: Selector lever position, shift lock / ignition key removal lock, shift behavior, instrument panel cluster display

- Foot-operated and hand-operated parking brake: Function, free travel and effectiveness, pulling to one side, juddering, squeal

- ABS function: A pulsing at brake pedal must be felt when performing ABS controlled braking

- Steering: Function, steering free play, steering wheel centralized when wheels are in straight ahead position

- Sunroof: Function

- Radio, Radio/Navigation system: Function, Reception, GALA, interference

- Multifunction indicator (MFI): Functions

- A/C system: Function

- Vehicle: Moving off line when travelling straight ahead (level road)

- Imbalance: Wheels, drive shafts, prop shafts

- Wheel bearings: Noises

- Engine: Hot starting behavior